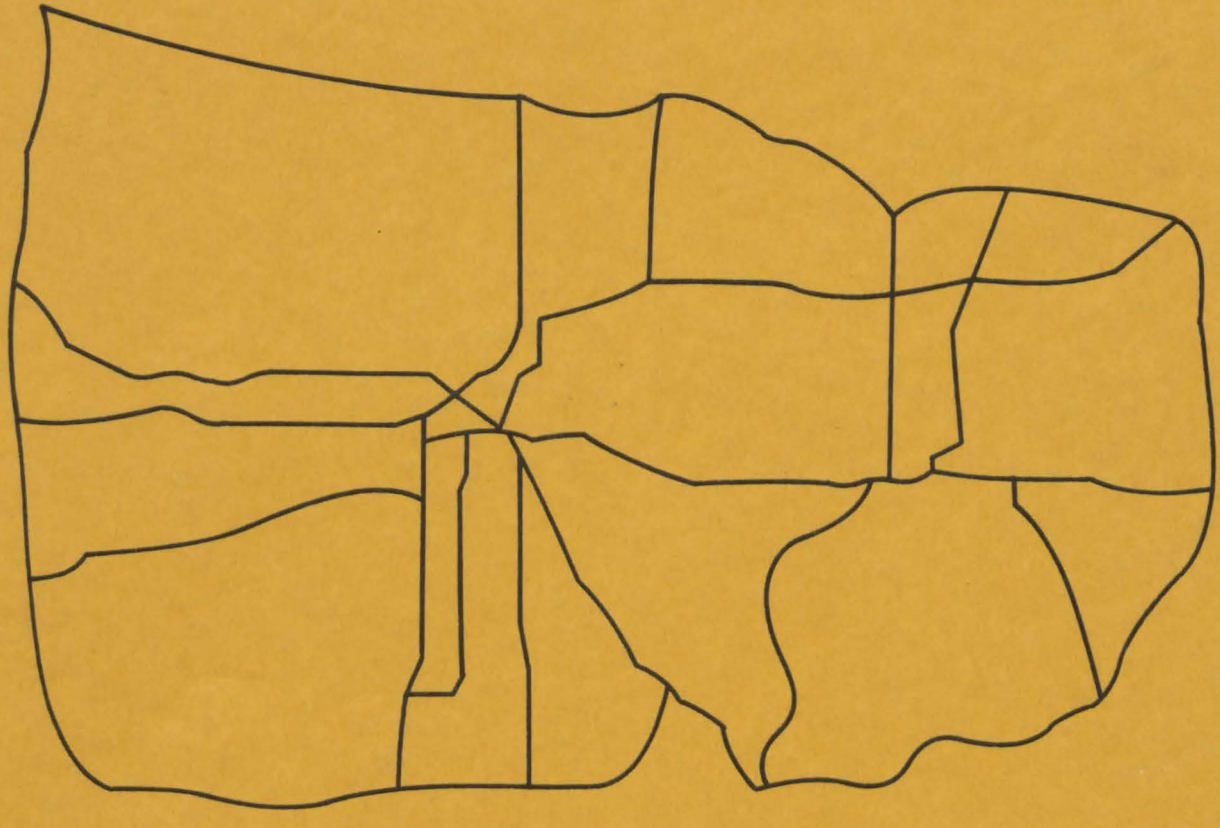
# "Catching Up" :

# BUS OPERATIONS AND POTENTIAL IN THE TWIN CITIES METROPOLITAN AREA





# "CATCHING UP":

# BUS OPERATIONS and POTENTIAL

# in the TWIN CITIES METROPOLITAN AREA

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A Report of the Program in Urban Transportation

Center for Urban and Regional Affairs

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# FOREWORD

The accompanying report exemplifies an approach to urban issues which the University Center for Urban and Regional Affairs (CURA) most wants to encourage.

The report presents the results of a careful, exhaustive study of an important problem. It has been carried out by dedicated faculty and students with the help of a public agency, (in this case, the Metropolitan Transit Commission), accompanied by frequent exchange of ideas and information with the technical and professional employees of that agency. The students combined field study of specific local problems with their broader on-campus studies of the nation's cities, urban transportation, and analytical techniques.

The resulting product is undramatic -- except perhaps to those directly concerned with the problem -- but filled with essential information upon which rational action can be based. The study illustrates how members of the University community can learn much from the wider community around them and, at the same time, contribute to a better understanding of problems and issues in urban and regional management.

John R. Borchert
Director, Center for Urban and
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# TABLE OF CONTENTS

Page Nos.

Appendices:

# LIST OF FIGURES AND TABLES

# DEFINITIONS OF TERMS

-Arterial: Any major, through street, as opposed to low-traffic residential streets.

-CBD: Central Business District; refers only to the downtowns of Minneapolis and St. Paul.

-Choice transit riders: Any transit rider who has the option of using a different mode instead of taking the bus; distinguished from "captive" riders, who cannot own or use a car for either financial or physical reasons.

-Cutback: Any terminal that occurs short of the end of the line. At the cutback a portion of the route's buses are terminated while the remainder continue on. Often a route may have several cutbacks, designed to increase the headway to those low-patronage areas along the route's furthest reaches.

-Express service: Any bus that stops only along certain portions of its route to pick up or discharge passengers.

-Frequency of Service: (See Headway).

-Headway: The time interval between buses on a given route, usually a regular interval expressed in minutes. Example: Route 18G Monroe has 20-minute headway.

-Limited Off-Peak Service (abbr. Ltd. OP): Off-peak service with irregular headways in excess of 60 minutes.

-Local Service: A bus that will pick up and discharge on request at any stop along its route.

-Modal Split: The division of ridership among competing modes. If the bus carries 10 out of a possible 50 riders, and the auto carries the rest, it is a 20% - 80% modal split.

-Mode: A distinct type of vehicle. The auto, bus, PRT, rapid conventional rail, etc. are all modes.

-Off-Peak (abbr. OP): Refers to all times of the day other than the rush hours.

-Pull-out, Pull-in: The act of moving the bus to or from its route assignment and the garage.

-QT: The Metropolitan Transit Commission's name for circulator routes using small (mini) buses.

-Rush Hour (abbr. RH): Also Peak Hour; those hours of heaviest ridership. Defined in this report as 7:00-8:30 a.m. and 4:00-5:30 p.m. on weekdays.

-Terminal: Any terminating point along a bus route. Each route as a rule has more than one terminal because of branches and cutbacks.

-Transfer: The act of changing from one bus to another in the course of a single trip. When a transfer takes less than ten minutes to complete, this report refers to it as a "good" transfer.

# I. INTRODUCTION AND GENERAL FINDINGS.

## A. Introduction

The problem of public transportation is endemic to most American metropolitan areas. It ranks with crime, pollution, inflation and foreign commitments as a national social, political, and economic issue. In addition to the chronic aspects of congestion, parking, and safety, the recent concern over energy shortages has further stressed the inordinately large role of the private automobile in urban transportation. Coupled with the construction of freeways and expressways, which are generally unsuitable for alternative modes, the public and governmental agencies at all levels have expressed opposition and, in some cases, have taken action to prevent further exacerbation of the problem.

In most metropolitan areas, city planning commissions, citizen groups, academic institutions, and even highway departments are taking steps to arrest continued growth of intraurban auto travel. A recent bill to Congress proposed the use of up to $800 million annually from the Highway Trust Fund to develop mass transportation facilities. Reports and studies abound; they range from modest proposals to solve downtown parking problems to comprehensive schemes which include rail, subways, and personalized rapid transit (PRT).

This study does not deny or preclude from the future such expanded mass transit systems; in fact, a multi-modal approach is implied. Most proposals have focussed on the central city with limited extensions of radial routes to outlying nodes. Apparently, the automobile is regarded as indomitable in lower-density Suburbia. However, two considerations of utmost importance are cost and time: the enormous outlay of funds to build automated rail or PRT systems reach into hundreds of millions

of dollars, as shown by BART in the San Francisco area; and they require not a few years but a decade or more to plan, build and render operational. With conventional bus technology, we believe that service can be significantly improved in both the central city and suburban areas within reasonable levels of expenditures. Furthermore, the recommendations herein, while not costed out, are capable of implementation within at most two years, assuming adequate financing. They represent short-term measures and an experimental program to increase bus ridership; if successful, extension and intensification is possible because of built-in flexibility and growing need.

This study is one project within the University of Minnesota's Program in Urban Transportation (PUT), under the direction of Professor Daniel L. Gerlough, Coordinator of the program since its inception in 1968. The funding for that program has come from grant money of the Department of Transportation in Washington. PUT is administered by the Center for Urban and Regional Affairs. During the final stages of research and publication, this study was assisted by the Minnesota Public Interest Research Group (MPIRG), which has reviewed the manuscript, and by contributions from students in the Urban Studies Program at the University. All results and opinions, however, are the responsibility of the authors.

During the course of the project, the main objective shifted from an emphasis on forecasting transit demand toward an analysis of the Metropolitan Transit Commission (MTC) bus operations. During the first phase a large volume of literature was collected (Appendix B), data were collected, and maps were prepared for background with the assistance of graduate students Gregory Stein and Philip Fletcher. During the second

phase, MTC officials provided access to transit reports and reference materials, as well as valuable discussion time and freedom to study the system in the field. We looked for areas of transit study that had not been properly explored. A survey of available studies revealed two significant points:

1. Almost all of the modal splits had been determined without consideration of varying levels of service. The formulae for current bus transit in most cities assume that mediocrity is normal and that service improvements can effect very little response.
2. The public's modal choices were predicted mainly in terms of their socio-economic status without determination of what transit characteristics must be offered to attract more riders.

As a result, the Suburban Transit Survey was conducted to find out the levels of service which might be required to compete with the automobile. MTC personnel cooperated and assisted with this Survey through questionnaire construction and use of their bulk mailing rate. The Survey results convinced us that bus transit could selectively compete with the automobile, given certain modifications and extensions of system operations.

This report supports and recommends a considerable expansion of bus service in the Twin Cities Metropolitan Area. Detailed study of present operations and forthcoming MTC changes are taken into account. The proposals are generally modest and incremental to alleviate the immediate problems and to forestall future ones.

B. General Findings.

The purpose of this report is to fill a research gap. To date, hundreds of thousands of dollars have been spent simply to study the possibilities for long range transit development in the Twin Cities. However, there has been only minimal study of the existing transit system, nor has anyone formulated a detailed plan to improve that system. The Metropolitan Transit Commission (MTC) has a plan that is fairly detailed in terms of capital expenditures, but stops short of specifying service improvements in any detail.

This report provides:

A. A set of minimum service criteria which, the authors conclude, the buses must meet if they are to compete with the automobile for ridership in anything resembling the present market place.

B. A detailed inventory of all services that do not meet these service criteria.

C. Numerous techniques by which service can be upgraded to a more competitive status.

D. A complete, highly-detailed listing of specific improvements and recommendations.

E. Cost and patronage estimates for different degrees of service improvement.

If there is one factor to keep in mind when reading the report, it is that the authors realize the present financial limitations on transit growth. The MTC is a pauper compared to the Highway Department. This fact precludes the type of utopian planning that characterizes so many long range transit proposals. Therefore, every growth recommendation in this report is designated to create the maximum service increase at,

hopefully, a minimum cost. Also, all the suggestions are designed to extend bus service to a broader market. If such an appeal is not made, the battle with the automobile can be conceded before it begins.

Thus the following improvements are recommended, though not necessarily in order of importance:

1. Try more innovative route deployment tactics, including more expresses of all types, intra-suburban local routes, small circulator loops, dial-a-ride, and selected suburban route extensions of already existing lines. The MTC has been reluctant to depart from its traditional downtown orientation.
2. Ensure that all downtown-oriented routes have an outlet to the suburbs. When possible, run such routes through suburban commercial and employment centers. Thus, whole new traffic sources may be exploited.
3. Decrease running times where possible. A faster bus is more likely to attract time-minded riders, and requires less revenue per mile to break even. Current schedules often alot too much time for a given run at certain times of the day.
4. Operate buses on crosstown routes at ten minute intervals. These routes are all quite short, but pass more transfer points than any others. Such a headway improvement would do more than any other service modifications of comparable cost to increase the route options available to the greatest number of riders. It would also free connecting buses to run at higher speeds, because a close connection would be guaranteed.

5. Run fast expresses along key corridors at all hours of the day. Currently the auto has a monopoly by default on all trips over ten miles.
6. Coordinate services with those of the four inter-city coach operators (Greyhound, Jefferson, Zephyr, S&A) whose routes serve portions of the metropolitan commuter zone that are beyond the area served by the MTC. This is a chance for all the parties concerned to increase ridership at a minimum cost by pooling their resources.
7. Service all gatherings which attract crowds numbering in the thousands (sporting events, rallies, festivals, etc.).
8. Simplify schedules, routes and fares as much as possible. Though no one has ever done a study of the problem, it is probably safe to assume that there is a direct relationship between such complexity and decreased ridership. The MTC has consistently perpetuated routes and schedules that are needlessly complex.
9. Increase the availability of schedules to the public by adding more telephone operators, posting schedules at stops, and publishing a master schedule book. The authors discovered case after case where people failed to use a convenient transit service because they were unaware of it. Efforts to inform the public must take place through as many informational channels as possible.
10. Negotiate free transfer arrangements with the private suburban bus companies.
11. Tap the bus driver as a data source. Interviews with drivers revealed that they possess a great deal of know-

ledge in the areas of scheduling and operating practices, but are rarely consulted.

12. Purchase the most comfortable buses available. The difference in cost would be relatively small and should be at least partially offset by higher rider morale (current local service buses, both old and new, are notorious bone-shakers).

13. Make it easier to work intermediate stopovers into a trip without adding an additional full fare for each stop.

The reader should not assume in view of the preceding recommendations that the report is a blanket indictment of the MTC. This is not the case. In fact, the MTC is one of the more progressive transit authorities in the United States. The pattern of the MTC's actions to date shows a genuine concern for improving Twin Cities transit services. The commission has even succeeded in reversing the ridership decline, a highly commendable achievement. However, while the MTC is constantly moving to upgrade its operations there is still room for improving public transit in our metropolitan area. This report provides detailed recommendations toward this goal.

# II. THE TWIN CITIES AND TRANSIT CONDITIONS.

## A. General Characteristics.

### Urban Sprawl.

The Minneapolis-St. Paul Metropolitan Area is approaching the 2,000,000 population mark and is projected to continue growth to at least three million inhabitants by the year 2000. It has maintained a steady, moderately fast growth rate for over a century through different periods of local tranport -- river-borne commerce, the horse and buggy, horse-drawn streetcars, railroads, electric streetcars, private automobiles, and buses. Many of these modes have disappeared or shrunk in importance under changing technology and spatial expansion of the urban area. The demise or replacement of a given mode has been chiefly due to increasing distances and the demand for faster movement. Other factors, such as economy, dependability and safety, and cleanliness have also stimulated new forms of transportation. Today, the Twin Cities area has arrived at a state of nearly total reliance on the automobile for intraurban travel. Excluding the walking trip and bicycles, which may be selectively significant, over 95% of the "origin-destination" movement is by motor vehicles.

A number of forces, both physical and cultural, have contributed toward this high degree of auto orientation. The land itself is relatively "open", or free from topographic barriers. The main river valleys and lakes have shaped the areal structure into a dispersed and low-density region. The double Central Business District further accentuates urban sprawl. Historically, the bulk of the Minneapolis-St. Paul urban growth has occurred during the Twentieth Century which may be called the Auto Age. In 1920 the metropolitan population was merely one-third of the present total; since 1945 the population has doubled. Thus,

land use in general, and the street-highway pattern in particular, has responded to and reinforced the mutuality of development and the automobile. While this relationship is true in most American metropoli, particularly in the suburban and fringe areas, it is especially pronounced in the Twin Cities area.

Urban transportation problems are primarily focused in the big cities. The Twin Cities has not yet reached the point of "crisis", in terms of congestion and delay, as have many larger cities of the East; but continued growth presages further sprawl, along with its attendant costs in time and money, and/or increasing densities. During the decade 1960 to 1970 the trends of the past continued, as indicated in Table 1, wherein the Twin Cities Area is ranked among the largest Metropolitan Areas in the country. The addition to population was 332,000 persons for a growth rate of 22.4% in both respects comparable to its rank of fifteenth in absolute size. The five-county area embraces some 2,100 square miles to yield an overall density of 861 persons per square mile, or roughly 1.3 per acre. Within the more realistic Urbanized Area, which is continuously built-up, the density is approximately 2,100 persons per square mile, or one-third that of Chicago's. The Twin Cities rank 10th in area and 31st in density among the 33 Standard Metropolitan Statistical Areas of over 1,000,000 population. In degree of suburbanization, the Twin Cities ranks 15th with 59% of its population residing outside of the central cities; this is a high although not exceptional, proportion compared with other SMSA's. A striking contrast is with the New York SMSA which reports, on about the same land area, only 32% of its residents living outside the city proper and an Urbanized Area density of 7,500 per square mile. Dispersion and low population density in the Twin Cities are clear restraints upon the development of high-volume

Table 1. Position of the Twin Cities among the 33 Largest SMSA's.*

| | 1970 value | Rank |
|---|---|---|
| Population | 1,814,000 | 15 |
| Population growth, 1960-1970 | 332,000 | 15 |
| Population Growth Rate, 1960-1970 | 22.4% | 14 |
| Area, in square miles | 2,107 | 20 |
| Density, population P.S.M. | 861 | 17 |
| Population outside central cities | 59 % | 15 |
| Family income, median | $11,682 | 9 |
| Housing, owner-occupied | 65.2% | 7 |
| Auto ownership (inc. taxicabs) | 1,034,000 | 12 |
| Use of public transport to work | 9.1% | 17 |

*Among Standard Metropolitan Statistical Areas of more than 1,000,000 inhabitants in 1970. The Twin Cities SMSA is defined as the five counties of Hennepin, Ramsey, Washington, Anoka and Dakota.

traffic corridors for mass transit.

High Income and Auto Ownership.

The Minneapolis-St. Paul area is a relatively high income region ($11,862, median family income in 1970); only eight large SMSA's exceed this level. The differential between central city and suburban incomes holds up in the Twin Cities where the suburban family income average is about $3,000 higher than that within the city. This income difference is sufficient to purchase an additional auto each year. Furthermore, only 11% of the metropolitan families reported less than $5,000 annual income, one of the lowest "poverty" levels in the nation.

The Twin Cities is still essentially an area of single-family,

owner-occupied dwelling units, despite the extensive construction of apartments and other multiple-unit housing. Approximately 63% of the people live in one-unit structures, and 65% occupy their own homes; both of these are high figures for a large metropolis. Strength of home ownership is generally associated with an abundance of automobiles.

Automobile registration of the Twin Cities is now over 1,000,000 vehicles, or roughly three-fifths of the total population. This percentage has steadily increased from 38% in 1950 to 51% in 1960. In the past few years a slight deceleration in the auto growth rate has taken place, but cars are still increasing faster than people. By the year 2000 there should be at least two million automobiles in the area. Therefore, despite the expected slowdown in population and vehicle growth, and even the implementation of improved public transit, the automobile will remain the dominant mode of travel for an indefinite period into the future.

Internal Variability

The foregoing generalizations should be modified by consideration of local variations. There are wide ranges around the metropolitan-wide averages -- that is, sub-areas or neighborhoods have variable mixes of favorable or unfavorable conditions for the automobile or, in other cases, for public transit. Generally, increasing distance from the core militates against good transit service. To some extent the relationships are reciprocal: good transit, at least before 1950, has encouraged growth along corridors of employment, trade, and higher-density residential land. Commercial streets, such as Lake and Nicollet, or Snelling and Arcade, can be traced in part to early streetcar service and subsequent bus routes. But the post-1950 strip developments in suburban areas, including apartments, are products of arterial roads and freeways.

In short, transit has neither influenced nor followed the directions of residential and business decentralization.

The following maps, Figures 1-4, are designed to illustrate the spatial variation of selected demographic and economic variables. They suggest the potential, even if it be marginal, for the expansion of transit service. Corridors can be identified, although it is not implied that they are immediate candidates for new or intensified service. Additional factors, such as existing routes, headways, and local traffic generators, must be taken into account, as later sections on route deployment and recommendations do in this report.

B. The Decline and Problems of Transit.

It is common knowledge that the amount and level (coverage and frequency) of transit in the Twin Cities area steadily deteriorated from 1945 to 1970. While the metropolitan area boomed and spread out, streetcar and bus service took a reverse direction. The number of person-trips by public transit gradually declined, and their percentage sharply dropped from nearly 50% by streetcar in 1940 to 22% in 1949, to 8% in 1958, and to 3% in 1970. Underlying this decline were a number of factors, some of them beyond the control or capability of mass transit:

1) Affluence, the automobile, and advertising.

The enormous increase in purchasing power (approximately three-fold) made it possible for virtually every family to own a car and for many households to have two or more of them. By 1970 about one-third of all Twin Cities households, and over half of the suburban families, were multiple car owners. Whether or not these autos are actually

Figure 1:

POPULATION DENSITY, 1970

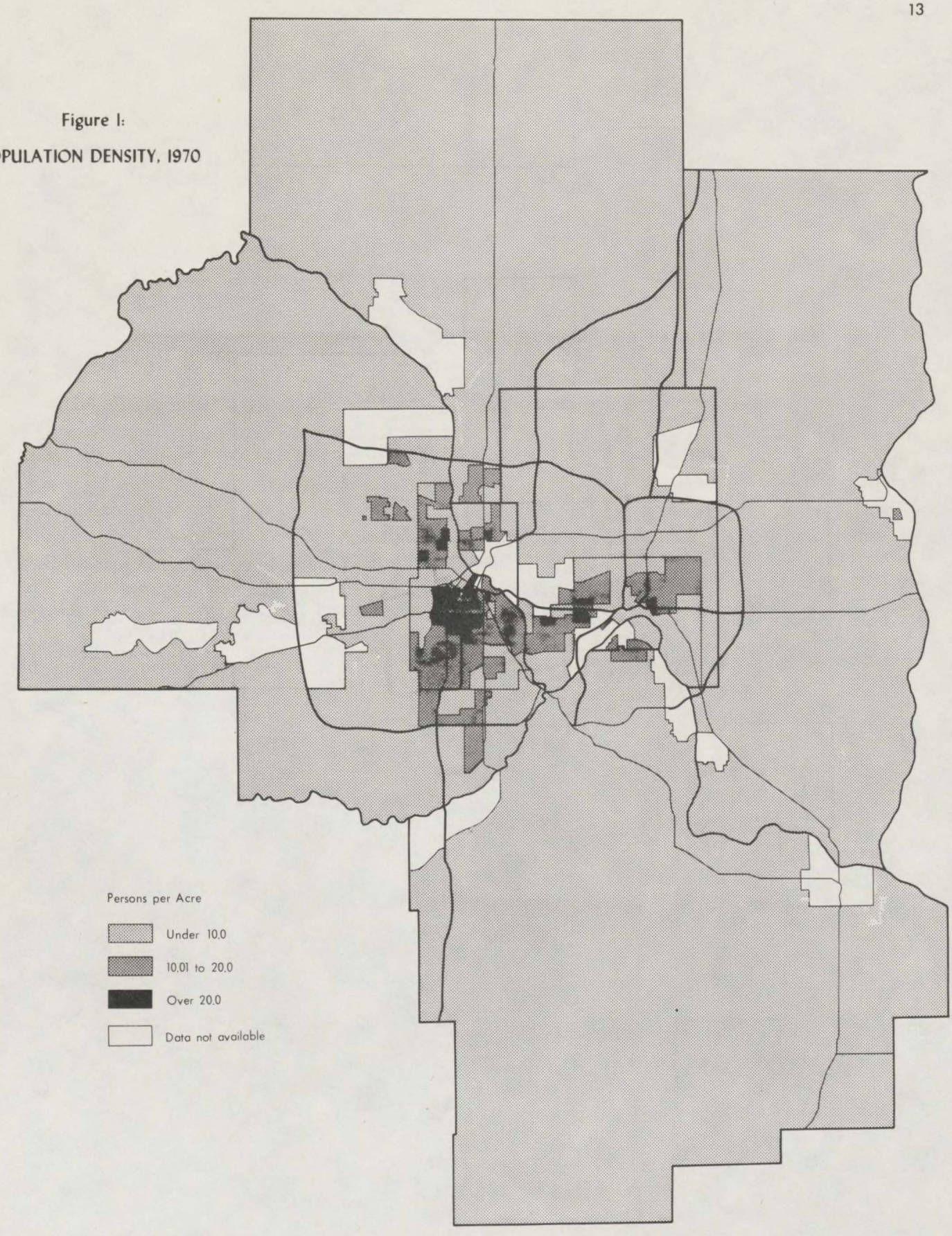


Figure 2:

AUTO OWNERSHIP, 1970

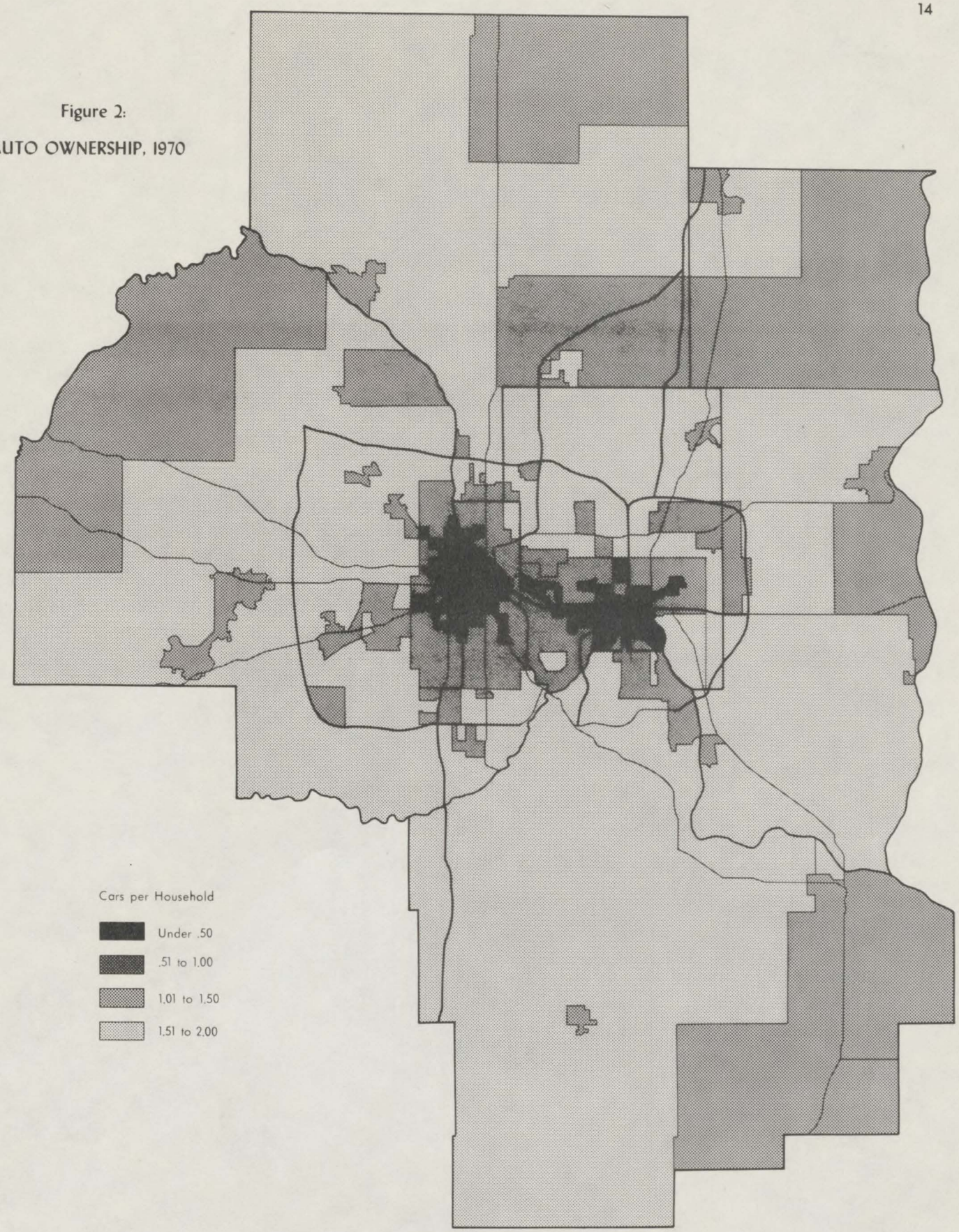


Figure 3:

PERCENTAGE OF SINGLE FAMILY DWELLINGS, 1970

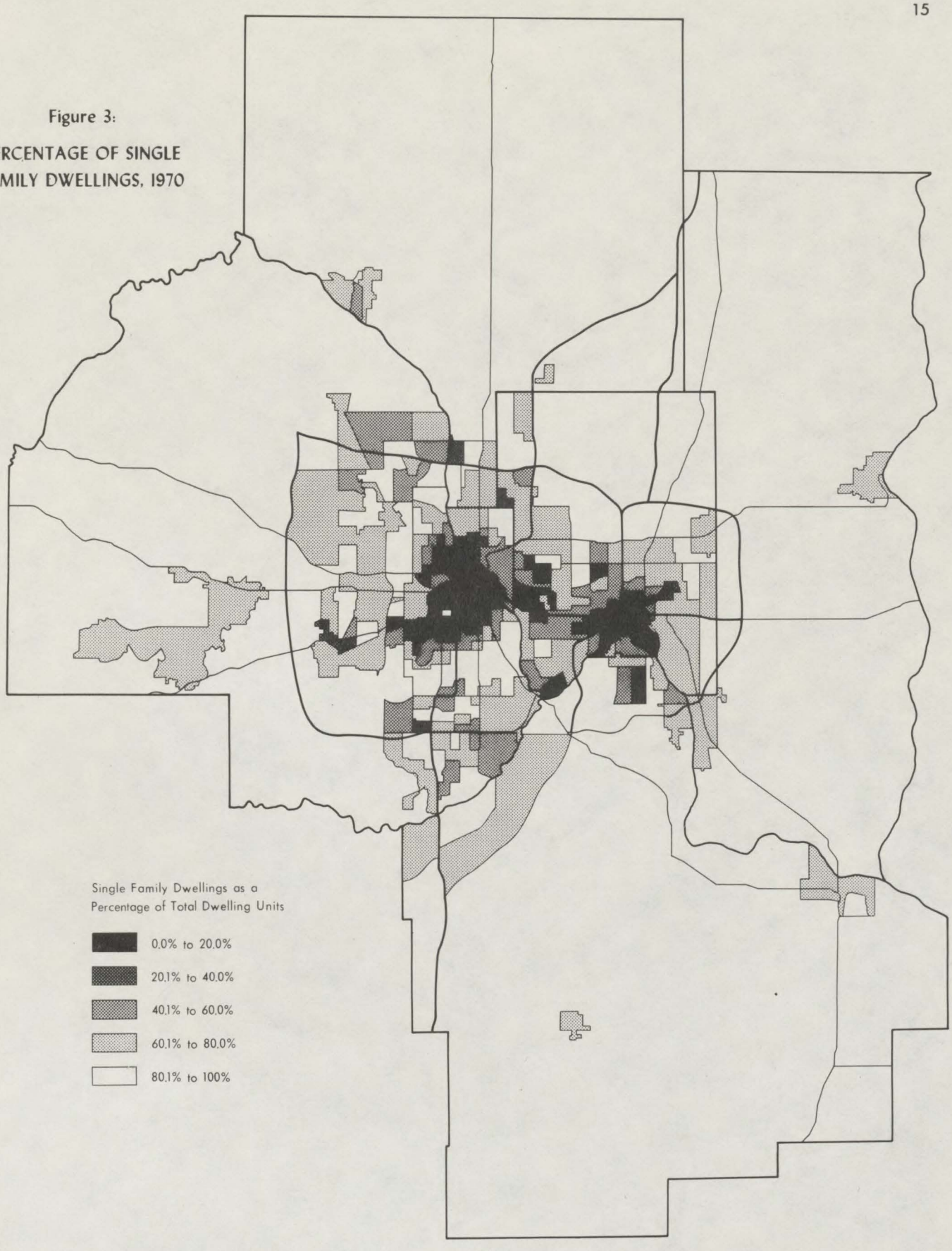
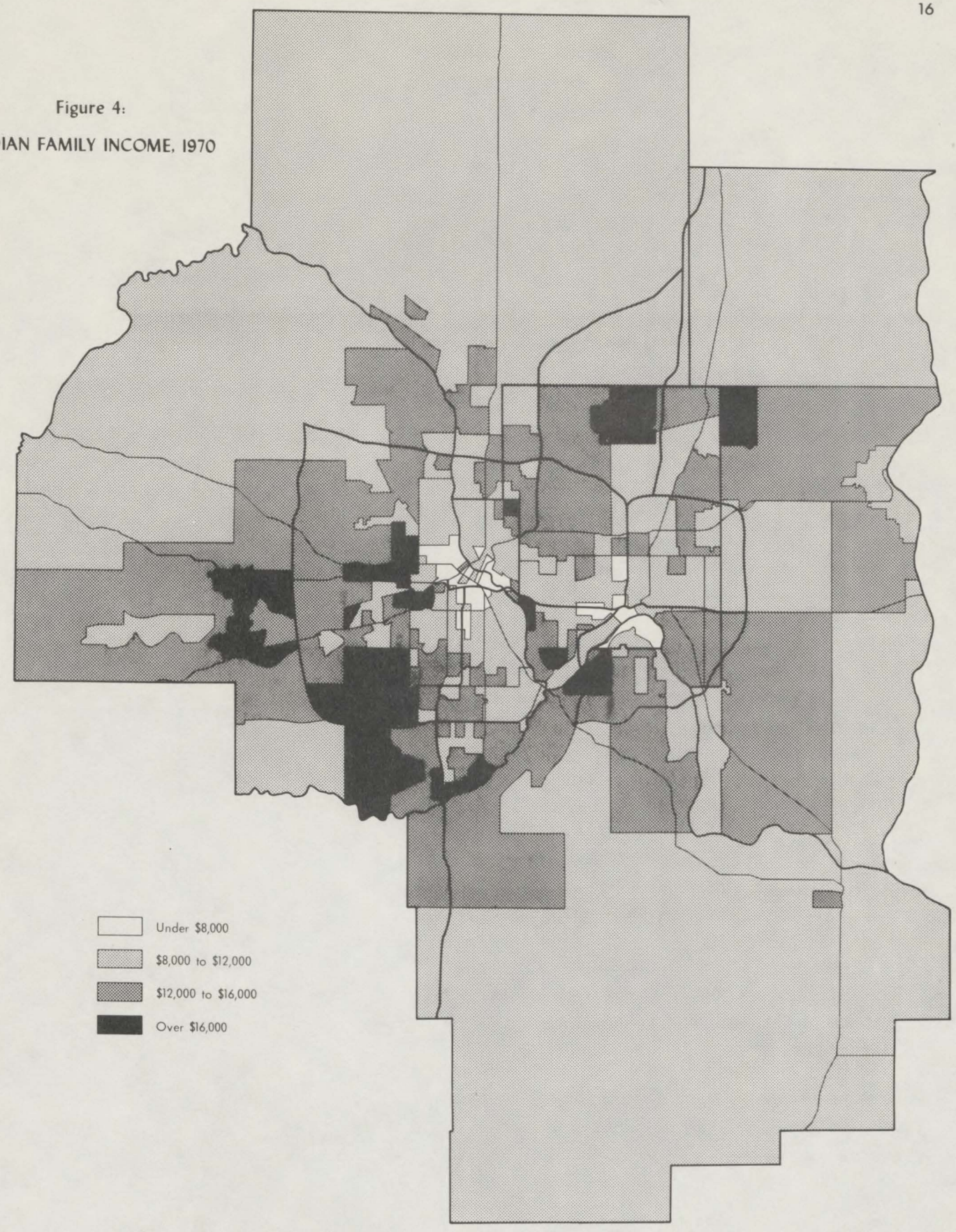


Figure 4:

MEDIAN FAMILY INCOME, 1970



needed is immaterial; they were bought and are being used. The auto-makers and their promotional efforts have persuaded Americans to own a second car and to trade in or sell the old one every five years, on the average. There has been no comparable campaign to promote mass transit or to limit auto ownership, at least until very recently. Life-styles have demanded constant access to the auto and have demeaned transit ridership to a second-class mobility status.

2) Time consciousness.

Americans want to minimize travel time and the auto is a personal vehicle which usually takes the trip-maker closer and faster to his destination. No transit system can effectively compete across the board on the time criterion alone.

3) Dispersion.

The centrifugal growth of cities has scattered trip-ends over a much larger area. This dispersal, along with a vastly greater volume of trips, has hurt transit, while justifying in the mind of the public, increased levels of auto ownership. In the Twin Cities' case this felt need for the auto is accentuated by climate; severe winters discourage use of transit, especially if the waiting and walking time are excessive.

4) Private ownership of transit and the profit motive.

Mass transit probably can never pay for itself out of the farebox, as many metropoli larger than the Twin Cities have long known. Subsidies for at least capital expenditures

if not operations are inherent in public transportation. Because of rising costs and the drive for profit, the private management of Twin City Lines before 1970 continually reduced service on the lighter runs which lost money until there was a bare skeletal system. Since the Metropolitan Transit Commission take-over, service levels have improved and the ridership decline has been arrested. However, a change in public attitude toward the usage of transit takes considerable time. Transit must be accepted as a fiscal loser, if one does not take into account the non-user benefits. A great deal of research has been done on cost benefits, for both users and non-users, to estimate the indirect benefits of transit. Recently, studies have attempted to incorporate even the less tangible benefits, such as land use impacts, reduced pollution, and safety. However, these salutary results for expanded transit have not been generally translated into public policy and, above all, expenditures for improvement. The present subsidies for MTC in the Twin Cities area, for example, are less than minimal and must be substantially increased for adequate transit service.

5) Traffic engineering and freeways.

Most of the traffic engineers and administrators in the key positions have been trained, and have vested interests in the auto mode. Until the past few years they have acted with little restraint from citizens or other public interest groups. The Federal Interstate Highway Act of 1956 authorized and started financing not only interurban free-

ways, but also intraurban freeways and connecting arterials. The designers and decision-makers have practically ignored transit and its potential. Freeways have been built for the auto and truck with little or no consideration for buses through special lanes, control of access, loading and unloading facilities, shelters, etc. Re-designing existing freeways, although costly and often out of the question, should be a high priority of highway departments to promote bus utilization. As a related point, the allocation of all gas tax revenues to the Highway Trust Fund for road purposes only has placed a difficult barrier in the path toward improvement of transit.

The previous points indicate the basis for the problem and do not augur well for a revival of transit. However, there are signs and encouraging trends toward its amelioration. Urban decentralization may be approaching its optimal or desirable limits. The growth syndrome - of more people and consumption - appears to be phasing out. The popularity peak of the automobile has probably been passed, as its costs, environmental impacts, and social effects are being fully evaluated. The threat of an energy shortage in fossil fuels is real. The dissection of urban areas by high-speed roads is undergoing strong criticism. The increasing influence of metropolitan planning agencies and a more enlightened, socially-conscious body of highway planners have placed the urban transport problem in a broader context. A recent Gallup Poll reported that 45% of the public regards public transit as a major problem

in large cities. The questions which remain are: what kind of transit; how much of it; where is it to be built; and how can it be paid for?

C. Studies and Objectives.

There exists a large body of literature on urban transportation in the United States. Every large city has seen the services of highway departments, consultants, planning agencies, and citizens groups turned toward the problem of improving transport conditions. The Twin Cities is no exception. Studies by the Minnesota Highway Department, with federal support, were conducted in the late 1940's and 1950's. These studies were geared mainly toward estimating demand, through "origin-destination" surveys, of present and future automobile traffic. The construction of freeways and expressways and the upgrading of arterial routes along high-volume corridors were principal products of this work. But the public transit component in the Highway Department studies was barely considered. Recent study by the highway planners has begun to take mass transit into account, but the long period of neglect has left a huge gap.

During the mid-1960's a growing realization of the inadequacies and problems of the auto-dominated urban scene began to emerge. Among the factors which contributed to this awareness were the following:

1) rapid traffic growth on the newly-constructed roads with congestion during peak hours;

2) the enormous outlay of land for freeways and the consequent disruption to neighborhoods;

3) the decline of the Downtown (Central Business District) and decentralization to the suburbs of services and employment;

4) high costs of operating and storing private vehicles;

5) air and noise pollution;

6) the virtual disappearance of transit for the public which could not, or cared not, to use the automobile.

Citizens began to ask, as they still do, is the auto the only answer?

In 1963 the Metropolitan Planning Commission (later the Metropolitan Council) initiated the Joint Program, a series of studies and cooperative efforts with the Minnesota Highway Department and other organizations. Its major purpose was to broaden the basis of transportation planning and to integrate highway plans within the larger context of metropolitan planning. The impacts of new route construction, interchanges and land use change were evaluated. With respect to Development Districts, communities, counties, and neighborhoods were to be consulted in advance of final decisions. Public hearings and approval by affected areas became part of the planning process. The Joint Program, along with citizens groups, helped to create an atmosphere of greater public involvement in urban transportation and an appreciation for alternative modes to the auto. However, the momentum and power of highway planning, coupled with continued growth in the number of cars, did little to encourage public transit.

A number of special studies were conducted in the late 1960's. Two nationally-recognized companies, with experience from other cities, proposed new transit technology and systems for the Twin Cities Metropolitan Area. Simpson and Curtin in eight reports analyzed vehicular traffic and, in general terms, operations of the Twin City Lines with recommendations for improvements. Alan Voorhees and Associates published technical reports of concepts, including conventional types and a variety of small-car systems, as well as the potential for rapid rail along existing

routes. Professor J. Anderson of the University of Minnesota has proposed in more specific ways how the Twin Cities can be served by a network of PRT lines. These proposals are judged to have considerable merit; they have been prepared by technical experts with engineering knowledge. At the same time, we believe that certain aspects of them are not realistic for the short-run future because of costs and the geography of the Twin Cities area.

Significant changes have taken place in the past several years since the establishment of the Metropolitan Transit Commission as a public agency. Bus service has visibly improved, patronage has increased (slightly), and the possibility for further growth is apparent. Among the developments and signs of support for expansion of the bus system, we cite the following:

1) The continued dispersion of population and employment in a low-density regions; this favors a flexible and versatile mode.

2) The success of the MTC, although limited as yet, in reversing the ridership decline, despite minimal improvements on a small budget.

3) The availability for better service within the present bus system (QT buses, for example), and its capacity for innovative improvements, such as described in the MTC report on Dial-A-Ride Technology (June, 1972).

4) The increasing cost of the automobile, particularly for fuel, and its lavish use of space.

5) The expressed desires and attitudes of the public toward transit, specifically the bus, as reflected in the transit surveys herein.

6) The support for expanded bus operations by a number of agencies and reports, for example:

   a. the Metropolitan Council, whose plan calls for 80 miles of highways with exclusive right-of-way for either buses or an automated system;

   b. the Minnesota Pollution Control Agency, which urges more express buses, more downtown fringe area parking, computerized traffic management, and shuttle buses, all for reduction of pollution.

c. the Metropolitan Transit Commission proposals, which include automation by 40-passenger vehicles in high-traffic corridors, along with greater bus coverage;

d. the Federal Urban Mass Transit Administration, which favors improved bus hardware for the present (along with research for new technology);

e. Barton-Aschman Associates' recommendations for busway lanes, on the grounds of cost savings; and,

f. a Citizens' League report urging non-construction steps to reduce dependency upon the auto;

7) The improved political and fiscal climate for financing transit aid, possibly by diversion of funds from the Highway Trust Fund. The Minnesota Legislature has generally supported partial use of gas tax revenues to upgrade transit. The Minnesota Highway Department has officially stated that "existing public transportation" be improved. A proposed State Department of Transportation would issue bonds for mass transit in the metropolitan area and outstate roads. The Federal Department of Transportation strongly favors mass transit aid to cities. Congressional support for use of the Trust Fund has increased, although no appropriation bill has been passed.

This report, therefore is predicated upon three main points:

1) That the public wants, and will pay for improved mass transit;

2) That the existing bus system can be significantly improved within the near future (two to three years) at moderate cost through available sources of funding; and,

3) That the detailed recommendations herein, which previous studies have not proved, can lead the way toward a multi-modal system of the future.

# III. WHAT DOES THE PUBLIC WANT?

## A. The Suburban Transit Survey.*

The suburban Twin Cities area has grown rapidly in the last decade, and now contains over half of the region's jobs and population; the suburbs also rival the two CBD's in retail shopping and sales. Yet, as the previous section illustrated, public transportation in suburban areas is minimal, compared to service in the central cities. Obviously, the suburban areas need to be served by public transportation because of their socio-economic importance to the Twin Cities as a whole. Since service is poor in the suburban Twin Cities area, no one really knows what service levels will attract its residents to mass transit. For this reason, the Project in Urban Transportation felt it necessary to survey suburban residents in order to determine what they want in terms of public transportation. With the survey results one can establish basic mass transit service requirements in suburban areas with the goal of attracting more people to public transportation.

The methodology and detailed results of the Suburban Transit Survey are given in Appendix D. The reader is encouraged to study the results closely before proceeding.

### Survey Highlights.

The results of the survey point toward definite desires of the suburban public regarding mass transit service requirements.

#### 1. Profile of Persons Surveyed.

A general profile of the suburban residents surveyed in early 1972 indicated that over 75% were drivers. This fact alone is a good

*Central city transit problems and improvements will be dealt with in later sections. This is due primarily to differing needs and currently moderate levels of service.

indicator of a mobile, non-captive, auto-oriented population, and serves to illustrate the level of competition suburban transit service will have to provide. This view is further supported by the fact that 76% used no means of public transportation. Only 6% of those suburbanites surveyed were regular commuters by bus; while 18% had used public transportation for other non-work related trips. Thus, suburban Twin City residents have met their travel needs through dependence on the automobile in the absence of adequate bus service in their neighborhoods.

2. Route Spacing.

An important service requirement illustrated by the survey relates to the spacing of transit lines. Good service means that lines should be spaced so that most riders do not have to walk more than two or three blocks (1/4 mile) to a transit stop. Similarly, the transit rider should not have to walk more than two or three blocks from the bus stop to the desired destination. According to these route spacing requirements, transit lines should maintain a 1/2 mile separation so that no rider will have to walk more than the 1/4 mile maximum. Where population density is low the above route spacing requirements should be relaxed to permit economically feasible transit operations.

3. Waiting Time.

A further point of consideration is waiting time at the transit stop. The survey results indicated that over 80% of the suburban residents would wait no longer than 15 minutes at a bus stop. The modal response in this case was a maximum five to ten minutes waiting time at a stop. Of particular interest is the fact that no one would wait more than 30 minutes. From these results one may conclude that headways should be kept to a 15-minute maximum or less.

4. Transit Travel Time.

The survey also pointed out strong preferences concerning transit travel time. Nearly 60% of the survey responses indicated that a bus trip could take 50% more time than a comparable auto trip. In other words, for a 20-minute automobile trip, the same transit trip could take from 5 to 15 minutes longer. Also, another 20% indicated that a transit trip which is twice as long as the same automobile trip would be acceptable. On the other hand, the remaining 20% desired the transit trip to be at least as fast as the automobile trip. Twin Cities' suburban residents, therefore, do show some tolerance for the time length of a transit trip. Because of this tolerance, trip speeds indicated by the survey are currently within the capabilities of local bus operations.

5. Trip Transfers.

Regarding trip transfers, the survey showed an overwhelming preference by suburban residents towards transfering once, at most. Only 15% of those surveyed indicated that two or more transfers per trip would be acceptable. Of great importance is the fact that transfers are tolerable only when the waiting time at the transfer point is 10 to 15 minutes, or less.

6. Schedule Information.

Schedule information should be made available in several ways. For example, information could be provided by telephone, through the mail, and posted at all transit stops and public places.

7. Facilities at the Transit Stop.

As a result of inclement Minnesota weather, survey responses pointed toward a strong desire for having more shelters available at

transit stops. The shelters should be lighted, heated, and have all necessary schedule information readily available.

Another important request was for more park-and-ride and/or "kiss-and-ride" facilities in suburban areas. Where possible, the parking lots of existing shopping, employment centers, and churches could be utilized. If not used as park-and-ride sites these shopping facilities should at least be incorporated as regular transit stops. This affords the rider a chance to take care of shopping needs while waiting for a bus, and in turn, could increase business for the cooperating merchant.

Parking ramp facilities at or near the transit stop were not deemed as being of great importance. Finally, the remaining 20% of those surveyed indicated that no facilities need be available at the transit stop.

8. Fares.

Given the improved level of service implied by the survey, Twin Cities suburban residents stated that they would approve of a fare of up to 50¢ per ride. A smaller percentage of the suburban public indicated that fares of 75¢ or greater were permissible. Such response was mainly from persons living on the fringe of the metropolitan area. Also, an equal number of persons supported a lower average fare of 25¢ for a normal transit trip. Given the choice of a token 10¢ fare, or no fare at all, only 3% of those surveyed would approve.

9. Improved Transit and Reduced Use of the Family Car.

When asked as to whether or not improved transit service would induce their family to dispose of one automobile, approximately 20% responded affirmatively (especially in families owning two or more cars). An equal number stated that they did not know, while the remaining 60% gave a definite "no" answer to the same question. One-car families were

the most reluctant to be rid of their automobile even though improved transit service might be available. Thus, the suburban public still desires to maintain the use of at least one automobile at all times. Despite this fact, many persons stated that while not wanting to part with a car, they would certainly make more use of public transportation and less use of their automobile.

10. The Most Important Aspects of Service.

Finally, those persons surveyed stated that the four most important aspects of service for them were, in order:*

1) comparative speed of a transit trip versus that of an auto trip;

2) the waiting time at a transit stop or transfer point;

3) the walking distance from home to the transit stop as a function of route spacing; and,

4) the fare level.

Of secondary importance were the following points:

1) walking distance from the transit stop to one's destination;

2) the facilities at the transit stop;

3) The number of transfers per trip;

4) the availability of schedule information.

11. Conclusions.

Viewing the transit survey results and comparing them to the operational capabilities of local bus operators points up the fact that the desired levels of service are within reach of current transit technology.

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*The three most important aspects of service plus the question of transfers are integral components of trip speed. When the responses for the above are combined under the category of trip speed they account for 68% of all responses, by far the most important aspect of service.

Following sections of this report will attempt to illustrate how current service can be improved in suburban (and central city) areas to meet the desired service levels of the public.

However, optimism over the results of the survey should be guarded. As is the case with any attempt to provide new, improved transit service, the suburban rider must be psychologically reoriented to accept the greater safety and convenience of improved public transportation while giving up his strong dependence on the automobile.

Other cities in the United States (New Orleans and Atlanta for example) have shown that bus ridership can be increased with improved service levels. Therefore, local transit operators are urged to pay heed to the results of this survey, and similar ones. By considering the stated levels of service, local public transportation can also be improved for all residents of the Twin Cities Metropolitan Area.

B. The Central City Transit Survey.

As a follow up to the Suburban Transit Survey, a survey of central city residents was undertaken*, on a somewhat smaller scale, in order to detect similarities between the two studies.

A detailed analysis will not be conducted on this survey because the general trends were quite similar to those discovered in the Suburban Transit Survey. Suffice it to say that the areas of highest correlation between the two studies were obtained for the questions regarding walking distance to and from the transit stop, facilities desired at the stop, waiting time, headway, comparative transit-auto travel times,

*The Central City Survey was conducted by Ron Janzen, Urban Studies Workshop on Urban Transportation, University of Minnesota. See Appendix E for more detail.

and willingness to dispose of one automobile given improved transit service.

However, because this survey interviewed central city residents, certain differences may be noted. These differences occur in the expressed number of transfers per trip, schedule availability, fare levels, and the most important aspects of service. The variations in results are largely attributable to the socio-economic differences between central city and suburbs and the presence of well-established transit service in the central cities.

Yet, because of the mutually reinforcing trends of the two surveys one may look beyond these differences and consider as most important the general demands that the public makes upon urban transportation. The remainder of this report incorporates these general trends into the analysis of transit operations in the Twin City Metropolitan Area as being fundamental aspects of transit planning.

# IV. SYSTEM ANALYSIS.

## A. Access and Coverage.

Coverage is defined as the area within 1/4 mile of a bus route. Numerous studies, including our own Suburban Transit Survey, indicate 1/4 mile as the maximum walking distance acceptable to most people. This distance, for the sake of convenience, may also be measured as two long city blocks (1/8 mile each) or four short city blocks (1/16 mile each). See Figure 5 for more detail.

Once an area has coverage, patrons may reach certain destinations. Which destinations they are, and how well they are served, determine "access". Whether this access is convenient depends on the travel time, waiting time, number of transfers, and fare necessary to reach the chosen destination. Difficulty with any or all of these factors may be enough to deter the potential rider from making the trip. For example:
1) fast, frequent service exists between the Midway Center area of St. Paul and the Minneapolis campus of the University of Minnesota. However, the fare is 60¢, twice the normal amount for a trip of this length;
2) there is no direct service from Columbia Heights to Brookdale, although this is a fairly common auto trip. To make the trip on a bus requires either transfering once in downtown Minneapolis or using one of the northside crosstowns and transfering twice. In either case, the bus ride takes about 70 minutes, compared with 15 minutes for the auto trip.

## B. Speed.

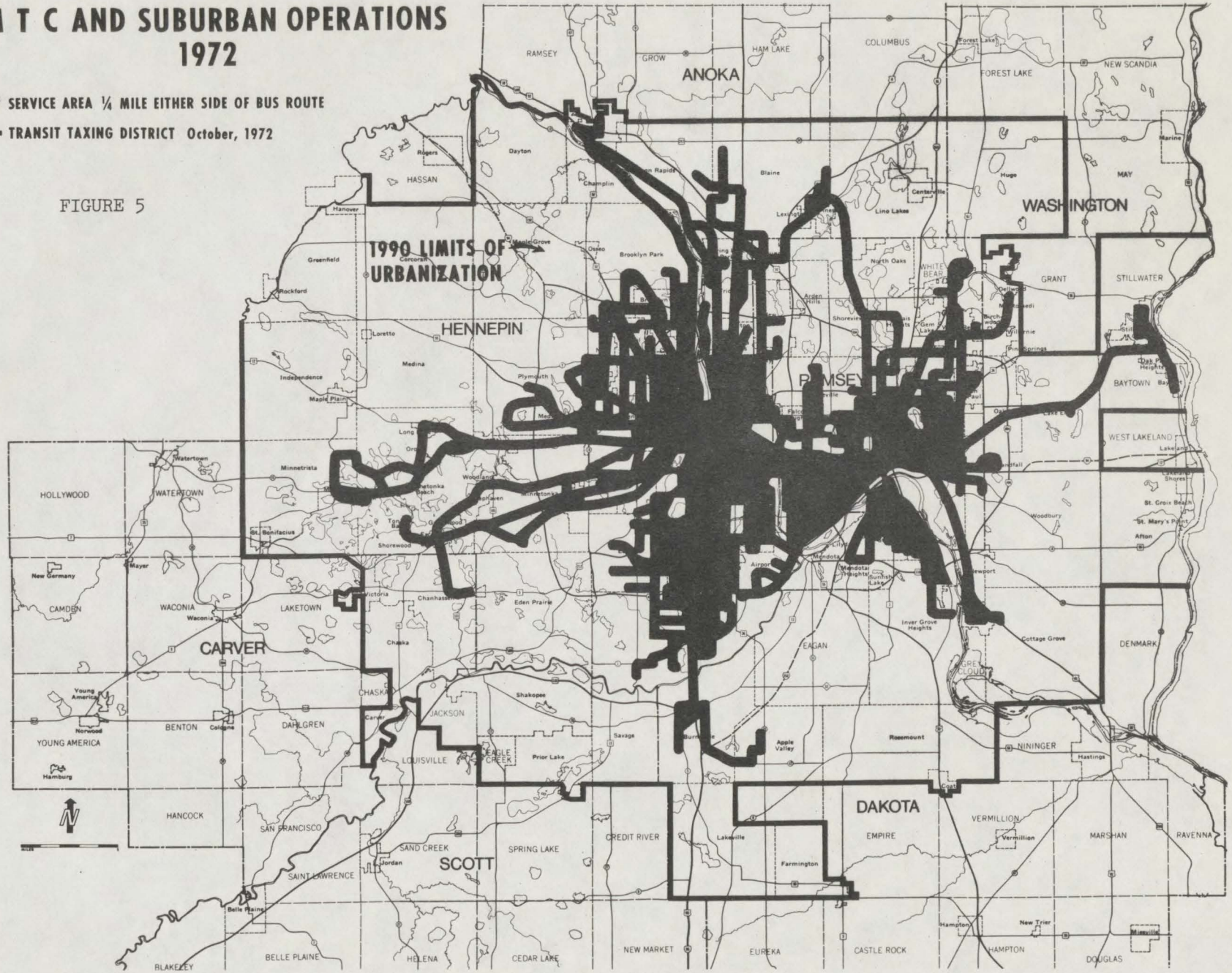
According to the Suburban Transit Survey, a bus may take up to 150% as long as an automobile to complete a trip and still be competitive. This rule, however, is flexible and upon examination of it, some rules of thumb may be defined.

# M T C AND SUBURBAN OPERATIONS 1972

SERVICE AREA ¼ MILE EITHER SIDE OF BUS ROUTE

TRANSIT TAXING DISTRICT October, 1972

FIGURE 5


1990 LIMITS OF URBANIZATION
ANOKA
HENNEPIN
RAMSEY
WASHINGTON
CARVER
SCOTT
DAKOTA
GRANT
STILLWATER
BAYTOWN
WEST LAKELAND
DENMARK
NININGER
MARSHAN
RAVENNA
VERMILLION
EMPIRE
EAGAN
HOLLYWOOD
WATERTOWN
CAMDEN
WACONIA
LAKETOWN
YOUNG AMERICA
BENTON
DAHLGREN
HANCOCK
SAN FRANCISCO
SAINT LAWRENCE
BLAKELEY
BELLE PLAINE
HELENA
SAND CREEK
SPRING LAKE
CREDIT RIVER
CEDAR LAKE
NEW MARKET
EUREKA
CASTLE ROCK
HAMPTON
DOUGLAS
JACKSON
LOUISVILLE
EAGLE CREEK
CHASKA
COLUMBUS
FOREST LAKE
NEW SCANDIA
HAM LAKE
GROW
HASSAN
MAY
Dayton
Champlin
Blaine
Hugo
Centerville
Lino Lakes
Rogers
Hanover
Greenfield
Rockford
Corcoran
Maple Grove
Brooklyn Park
North Oaks
WHITE BEAR
Arden Hills
Shoreview
Gem Lake
Loretto
Medina
Plymouth
Independence
Maple Plain
Minnetrista
Watertown
Mayer
New Germany
St. Bonifacius
Shorewood
Victoria
Chanhassen
Eden Prairie
Chaska
Carver
Young America
Norwood
Cologne
Hamburg
Waconia
Shakopee
Savage
Prior Lake
Apple Valley
Rosemount
Lakeville
Farmington
Jordan
Belle Plaine
Inver Grove Heights
Cottage Grove
Woodbury
St. Croix Beach
St. Mary's Point
Afton
Hastings
Vermillion
Marine
Pine Springs
Oak Park Heights
Lakeland
Lakeland Shores
Newport
Wendota
Wendota Heights
Sunfish Lake
Mendota
Airport
Minnetonka
Minnetonka Beach
Woodland
Tonka Bay
Orono
Long Lake
Medicine Lake
Maplewood
Oakdale
Landfall
Oakdale
Lake Elmo
Stillwater
Oak Park Heights
Baytown
Bayport
Pine Springs
Gem Lake
Birchwood
Willernie
Dellwood
Grey Cloud
Inver Grove Heights
Miesville
New Trier
Hampton
Farmington
Lakeville
Credit River
Spring Lake
Sand Creek
Jackson
Louisville
Eagle Creek
Chaska
Carver
Young America
Norwood
Cologne
Hamburg
Waconia
Victoria
Chanhassen
Eden Prairie
Minnetrista
Watertown
Mayer
New Germany
St. Bonifacius
Shorewood
Tonka Bay
Minnetonka
Minnetonka Beach
Woodland
Orono
Long Lake
Medicine Lake
Maplewood
Oakdale
Landfall
Lake Elmo
Stillwater
Oak Park Heights
Baytown
Bayport
Pine Springs
Gem Lake
Birchwood
Willernie
Dellwood
Grey Cloud

We theorize that people tend to allow the same amount of time for trips of differing lengths, whether three miles or six miles. We are inclined to set this fixed time unit somewhere in the 20 to 30 minute range. We do not have documented evidence to support this, but the unit is a convenient one that allows leeway for terminal time and delays en-route. Perhaps the trip takes only 15 minutes; it is nonetheless difficult to do much during the remaining 5-15 minutes, so we tend to assign this time to the trip as well.

Under existing schedules, local (not express) buses tend to cover about six miles in a half hour. Because they must navigate through the CBD and make frequent stops thereafter, their travel time is often 200-250% of auto time, considerably over the competitive figure of 150%. However, their slower speed is made more acceptable because they complete the trip within the time-convenience threshold of 20-30 minutes.

The 150% formula applies more accurately to trips in the six to ten mile range. Travelling these distances, an auto with access to a freeway takes 15-20 minutes. Consequently, a bus should take no more than 25-30 minutes. Here the time-convenience threshold works against the bus, restricting its overall time allowance. When faced with auto competition on the freeway, the bus must also leave the streets and become a limited-stop service or it will be unable to compete.

The situation changes somewhat if there is no freeway. If forced to travel ten miles on city streets, the auto's time increases from 15 to about 30 minutes. Thus the half hour time-convenience period is extended by the auto itself and no longer applies. This puts the bus in a better competitive position, now that the situation is no longer "auto on freeway" vs. "bus on city streets". Under the 150% formula, the bus may take 45 minutes. More important, when allowed that much time, a

local service is equal to the task.

As the trip increases in length beyond ten miles, the bus finds itself in a progressively poorer position. Trips of this length begin to require a second transfer, more than most people are willing to carry out. Autos are less likely to be confined to city streets, because of the significant probability of utilizing a freeway, or because such a trip is likely to wind up in open country. In order to adapt, the bus must be deployed in limited stop service, and the non-stop portion of the route must increase with the overall distance to be covered.

It becomes clear at this point that a maximum practical service range must be arrived at, a geographical area in which transit can serve most of the people most of the time. According to the Metropolitan Council, the future of local public transit lies predominantly within the I494-I694 freeway ring. Population densities are higher, and there is less room for the population to disperse and become difficult to serve. Service outside the freeway ring will occur along the following corridors that radiate from the CBD's: Highway 52-Brooklyn Boulevard, Fridley-Coon Rapids-Anoka, Maplewood-North St. Paul-White Bear, Oakdale-Stillwater, Cottage Grove-Hastings, Bloomington-Burnsville, and the Lake Minnetonka area. Even with this growth, however, the Metropolitan Council's contention that the great majority of transit trips will remain within the ring is a sound one.

What then should be the maximum trip length at which a bus can stay within 150% of the auto trip time? A study of existing timetables indicates that a limited stop service on a freeway or fast-moving divided arterial can travel roughly 15 airline miles in 45 minutes, a speed of 20 mph, under heavy rush hour conditions. Such a trip length would be adequate to serve the vast majority of all trips within the freeway ring.

Fifteen mile service within 45 minutes is not possible in many cases, however, because of the necessity of transferring. Unless the layover between buses is quite short (five minutes or less) the lost time will exact a mileage penalty. If the transfer averages ten minutes, the trip length of a 45 minute trip will be cut to about 12 miles.

Given this trip length capability, what percentage of all trips can transit expect to compete for? This report cannot give an exact numerical answer to that question, but some trends and generalities can be identified. First of all, there is no doubt that transit falls far short of the automobile's capability of serving dispersed-origin to dispersed-destination trips. Transit can cover a certain portion of these, but only as a coincidental side effect. Bus transit's primary role has always been and will always be to serve activity centers. To date, MTC has concentrated on traditional activity centers such as the Minneapolis and St. Paul CBD's and the University of Minnesota. Though outstripped in growth rate by their suburban competitors, they nonetheless remain the largest employment concentrations in the Metropolitan area. They are large enough to draw trips from a considerable distance; there are enough of these trips to support no-transfer service from the CBD's to almost every built-up residential area within the service area. The most dramatic evidence of this so far is the recently inaugurated I-35W corridor project, which features 14 MTC express routes in addition to four routes operated by the Bloomington Bus Company. The longest of these is route 35M to Apple Valley, which covers about 20 miles - the longest bus route the Twin Cities has ever had. It seems clear that the CBD's can be adequately served with almost no limitation on trip length.

What then is the prospect for suburban employers? Currently, many are not served by transit at all. Those who are served tend to be so

from their CBD side having by chance been located on a radial from the CBD. Access from other parts of the suburbs usually is nonexistent unless the same radial is extended beyond the employer. The trip distance demand to such employers is not as scattered as the CBD's. According to a national report, the large majority of trips to suburban employers fall within a range of six miles. We are confident of this figure because a number of the employers studied were located in the Twin Cities area, and these had a high correlation with the national findings. The study also showed that most such employment trips originated on the side of the employer away from the CBD, meaning that the majority of the travel market for such trips has yet to be tapped.

Given this six-mile commuting range, the tendency of employers to cluster in nodes, and the tendency of these nodes to line up in satellite rings around the CBD's, conventional bus service has a good chance of meeting most of these commuters' needs. The speed capability of local buses is greater in the suburbs, because of the overall lower traffic congestion there; such buses should be able to handle all but the five-to-six-mile trips involving one transfer. The latter would require a limited-stop service on one leg of the trip.

The shopping trip is the second most frequent type of trip in the metropolitan area. Access to the CBD for this purpose is good (as one would expect), though not as good as for employment trips, because of the special express services that exist for the latter. Even so, the private suburban bus companies do operate off-peak express services that are moderately successful. In a half hour, they can travel up to ten miles from the CBD. This is indicative of the type of attraction the CBD's still have. Suburban shopping centers are growing, but do not yet attract such trips in large numbers. According to the same national

report cited earlier, shopping trips to suburban centers are somewhat shorter than work trips in general. The great majority of shopping trips occur within five miles of the center. The studies of the Southdale and Knollwood shopping centers support the accuracy of this figure. As with suburban employers, bus access to shopping centers tends to be limited to routes whose prime function is to serve the CBD. Cross-suburban access tends to be minimal. However, it should not be hard at all to serve such modest trip lengths with conventional bus routes. We will deal later on in this report with the question of route extensions necessary to provide good access.

Having stated the premise of demand for speed, we wish to dwell on current schedule speeds and how these may be increased. The MTC's system-wide speed is twelve miles per hour. This figure is negatively influenced by "dead" time spent laying over at terminals and by the extremely slow speeds that occur when traversing the CBD's. Not surprisingly, current schedules speeds increase with the distance from the CBD. Allowing for a number of exceptions, there are distinguishable speed zones. Within the CBD's, buses travel at little better than a walk, or about five miles per hour. Next comes a narrow "moat" created by rivers, railroad yards, freeways, or vacated urban renewal land, where few stops are made. This is followed by a one to two mile wide belt of high density population, such as exists south to Lake Street in Minneapolis and west to Lexington Avenue in St. Paul. Speed here averages around 12 miles per hour, which allows for stops at almost every block. The next zone extends roughly to the Minneapolis or St. Paul city limits; stops are less frequent and the speed increases to about 15 miles per hour. Once into the suburbs, speed increases further to around 18-19 miles per hour.

There are exceptions to these rules, and they deserve extra examination. For example, within the 15 mile per hour zone, the #10 Central travels 8.6 miles per hour, while the #8 Lyndale reaches 18.3 miles per hour; the #18 Nicollet travels 21 miles per hour in the 15 miles per hour zone, but drops to 18.7 miles per hour once it reaches the suburbs.

What accounts for these discrepancies? In certain cases they are caused by diffences in traffic volume. That would account in large part for the low speed of the #10 Central. The difference in traffic also shows up in St. Paul. There the heavily-travelled #3 Grand goes 10.3 miles per hour while the lightly-travelled, adjacent, and parallel #10 St. Clair attains 12.5 miles per hour. The theory that patronage always determines speed is undermined, however, when one examines the next line after the #10 St. Clair. This is the #14 Randolph. It is somewhat busier than the #3 Grand, yet it travels 15 miles per hour. If one did not already suspect, it now becomes evident that some of the discrepancies in the speeds of different lines are somewhat arbitrary decisions of the scheduling department. For example, it is common knowledge among MTC Snelling Garage drivers that the #7 Thomas and #10 St. Clair have very slow schedules. These runs therefore have become almost exclusively the province of drivers who like to drive slowly.

One reason for inordinately slow schedule speeds has to do with the changing makeup of the cities. Freeways and urban renewal have stripped some neighborhoods of their ridership. Meanwhile, low income housing projects, senior citien high-rises, and greater apartment concentrations have added more business to some lines. Load patterns have further changed since the start of free rides for senior citizens. On the whole, however, schedule speeds have not been reviewed for years. It is therefore not surprising to find inconsistencies.

Every bus rider has experienced the annoyance of a bus that dawdles along to avoid running ahead of schedule. This puts the bus in a very bad light indeed, especially when compared to the auto. The choice transit rider must sacrifice quite a lot of time in order to ride the average bus. He must wait on a corner longer than he would normally like to do. If the line has infrequent service, he will experience anxiety if he thinks he may have missed the bus. Once aboard, he may find the ride bumpy, the route circuitous, or the driver surly. In view of this, it adds insult to inconvenience if the bus ride then seems like the proverbial "slow boat to China". The rider needs the reassurance that despite its frequent stops, the bus is going as fast as it can. This does occur on some lines, such as #14 Randolph and #16 University.

There are various ways to improve schedules. The simplest and most straightforward is simply to run the route in less time, wherever possible. There are a number of routes that can be speeded up over their entire length by five to ten minutes. Most other routes have what the drivers refer to as "dead spots", short stretches where they must run unnecessarily slow. These, we suggest, could be eliminated by a system-wide review of schedule times.

Another easy speed-up measure is the express or limited stop service. It is by no means a new idea, and the MTC deserves credit for implementing a great deal of it during their short tenure. Nonetheless, there are many routes that could use some kind of express service that currently have none. These include in Minneapolis: #8 Lyndale, #9 Glenwood, #19 28th Avenue, and #22 34th Avenue; and in St. Paul: #9 East Seventh Street, and #12 Roseville.

There are additional lines which currently run only street expresses, but should receive freeway expresses instead. These include, in

Minneapolis: #16 University, #17 St. Louis Park, and #19 Olson; and in St. Paul: #12 Stillwater and #15 White Bear.

On some lines, express service of the conventional type does not suit itself to the route. These include heavily-travelled lines close to the CBD and lines that carry substantial loads in both directions regardless of the time of day. For these lines, a skip-stop service is better suited. This report favors an idea called, arbitrarily, the Red, White, and Blue Plan. Every bus stop on the desired portion of the route, and every bus on the route, would receive a sign, indicating one of the three colors. Buses would stop only at stops displaying the same color. All buses, however, would stop at transfer points and large traffic generators. The overall effect would be to reduce the number of stops for a given bus by about 60%. We wish to restate that this strategy would be used only on the heaviest lines, and then only during peak periods when headways of under five minutes are in effect. These would include such lines as #18 Nicollet, #5 Chicago-Fremont, #16 University, #17 Nicollet-Hennepin, #21 Selby-Lake, #8 Franklin-Lyndale, #4 Bryant, and #6 Xerxes-France. Should the reader be raising in his mind the question, "Doesn't skipping three blocks instead of two blocks at a time unnecessarily complicate matters for the bus rider?" We contend that the greater complication is worth the increase in speed. Also, even with stops every third block, the passenger could still debark one block from his chosen stop.

Beyond these devices for increasing speed, there are a number of barriers to speed which might be removed, making for a tighter schedule.

1) Traffic signals are the most common delay encountered by buses. They are set up to control the smooth flow of continuously moving automobiles. Buses, unfortunately, cannot move without intermediate stops,

causing them to constantly encounter red lights. Every bus rider has experienced the frustration of pulling up to a green light, only to have it turn red as the last passenger gets on or off. In searching for a way around this problem, we contacted the St. Paul Traffic Engineering Department, which has purchased a 3M product called Opticom. This is a device that allows emergency vehicles to change traffic signals to green. We asked if this concept could be applied to buses. The answer we received was an ambivalent yes and no. The negative side is that buses should not be allowed to change signals from red to green. There are too many buses, and they do not carry the additional advance warning equipment of an emergency vehicle. Should such an application occur, there would inevitably be instances of pedestrians being trapped in the middle of intersections.

However, the possibility does exist for a more passive type of control. This would simply allow the bus driver to hold a green light beyond its ordinary length until the bus could clear the intersection. To avoid abuse of the privilege, there would probably be limits placed on the system. It could not be activated until the bus came within a certain distance of the intersection, and the hold might only last a certain number of seconds.

According to their Transit Development Report, the MTC plans to install override devices on certain portions of Lake Street (Minneapolis) and Marshall Avenue, Snelling Avenue, Larpenteur Avenue, and Como Avenue (St. Paul) during 1974. The report did not specify the type of device.

2) The improper application of stop signs is a problem more easily solved. Most of the problems arise when the bus traverses streets that the city: a) does not consider arterials or, b) considers arterials, but gives a high priority to pedestrian crossings. In the case of the former,

many of the intersections are entirely unprotected or are haphazardly protected. Examples are West 56th Street, East 52nd Street, 52nd Avenue North, Cedar Lake Avenue, Grand Avenue Northeast, East 60th Street, 55th Avenue North, Pleasant Avenue, and Washburn Avenue North, all in Minneapolis. Except for a few places in Brooklyn Center, that is the extent of this problem. These streets should simply receive stop sign protection; the current situation, besides slowing down the bus, is unsafe.

One faces a problem when attempting to remove existing pedestrian crosswalk stop signs from recognized arterial streets. Each case must be individually judged, paying attention to the neighborhood's desires. We will only list here those streets that we feel should be re-examined. They include: in Minneapolis, Washington Street Northeast, Grand Street Northeast, Monroe Street Northeast, Bryant Avenue North, 51st Avenue North, Plymouth Avenue, Golden Valley Road, 42nd Avenue South, 46th Avenue South, 34th Avenue South, 28th Avenue South, Chicago Avenue, Grand Avenue South, Bryant Avenue South, Penn Avenue South, West 44th Street, West 39th Street, and West 58th Street; and in St. Paul, Pascal Avenue. As was the case above, few such examples exist outside of Minneapolis.

3) The MTC has carried on the traditional 20 mile per hour speed limit over larger bridges and viaducts. We doubt that there is an adequate safety reason for such slowdowns, especially over firmly-constructed structures such as the new Washington Avenue bridge. Also included in the list are the following: Lowry Avenue, Broadway Street, Hennepin Avenue, Third Avenue, Franklin Avenue, Lake Street, Ford Parkway, Wabasha Street, Robert Street, East Seventh Street (St. Paul), East Third Street (St. Paul), and North Seventh Street (Minneapolis).

4) Skip-stopping, or stopping every other block, is currently not practiced on all the lines that traverse short (1/16 mile) blocks. This is contrary to MTC's own Standards of Service.

5) During snowy weather, buses have a particularly hard time keeping their schedules. We recommend that sanding devices be installed on the buses, and that the buses spread sand in accordance with agreements between MTC and the participating municipalities.

C. Headway and Transfers.

Headway is defined as the length of time between buses at a given stop along a route. It may be used interchangably with the term "frequency of service". As the frequency of service increases, headway decreases, and vice-versa; but headway is equivalent to frequency.

Headway is very important to the transit rider because he, in most cases, values his time and grows impatient when wasting it waiting for a bus. The Suburban Transit Survey indicates that a large majority of current and potential transit riders want to wait no longer than 15 minutes for a bus. None would wait over 30 minutes. What does this tell us? We are in doubt, because the question asked on the survey form was inadequate in scope. There should have been two questions, "How long would you wait for a bus?", and "How often should the bus operate?". Presumably, a person with a schedule in hand can minimize his waiting time, regardless of the bus headway. Therefore, his waiting time and the bus headway are independent of one another. However, a person without a schedule may have to wait the full headway period; his waiting time is to a degree dependent on bus headway, especially if the frequency of service is greater than every 15 minutes. However, if the headway is 15 minutes or less, the conflict between rider expectations

and service realities is greatly reduced. The rider, knowing that he will not face an undesirably long wait, may dispense with the use of a schedule altogether. The rider feels far more independent to move about. The transit operator, according to one of MTC's reports, is also free to experience a higher percentage of late buses with no negative feedback from the ridership.

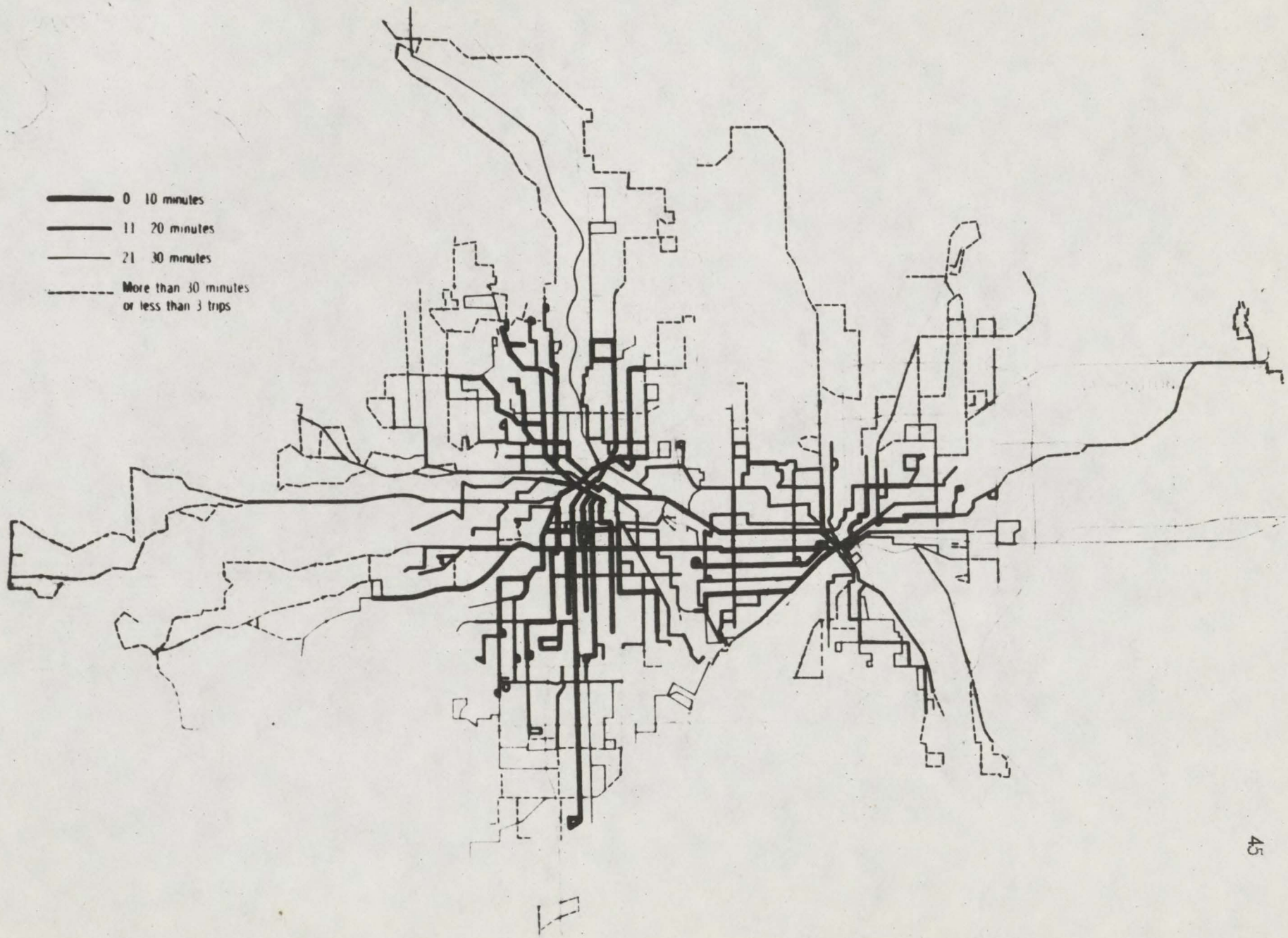
For the Twin Cities as a whole, how many of the existing lines fall within the limit of the 15-minute headway? This depends on the day of of the week and the hour of the day. Weekdays are the most complex and important, so we will begin there. (For more detail refer to the following maps.)

I. Weekdays: pre-morning peak; no 15-minute services; mostly hourly headway beginning as early as 4 a.m. until sometime shortly after 6 a.m.

II. Peaks (approximately, 6:30-8:30 a.m. and 4:00-5:30 p.m.). Headways vary from line to line. Peak routes fall basically into three groups: 1) Frequent: buses are added continuously up to the 8:00 a.m. and 5:00 p.m. times of heaviest ridership. Headway may be every one or two minutes in the Minneapolis Model Cities area. Farther out, it tends to remain in the five-to-ten-minute range. There is a large cut-back at, or slightly before, the center city's limits. Only a few such services penetrate into the suburbs, with five minutes being the shortest interval. 2) Medium: This describes the bulk of the remaining services. Fifteen-minute headway is the rule here. 3) Infrequent: These routes include special industrial services, many of the rush hour-only expresses, new experimental local services, and long distance (15-plus miles) routes. These services all have headway in excess of the fifteen-minute standard.

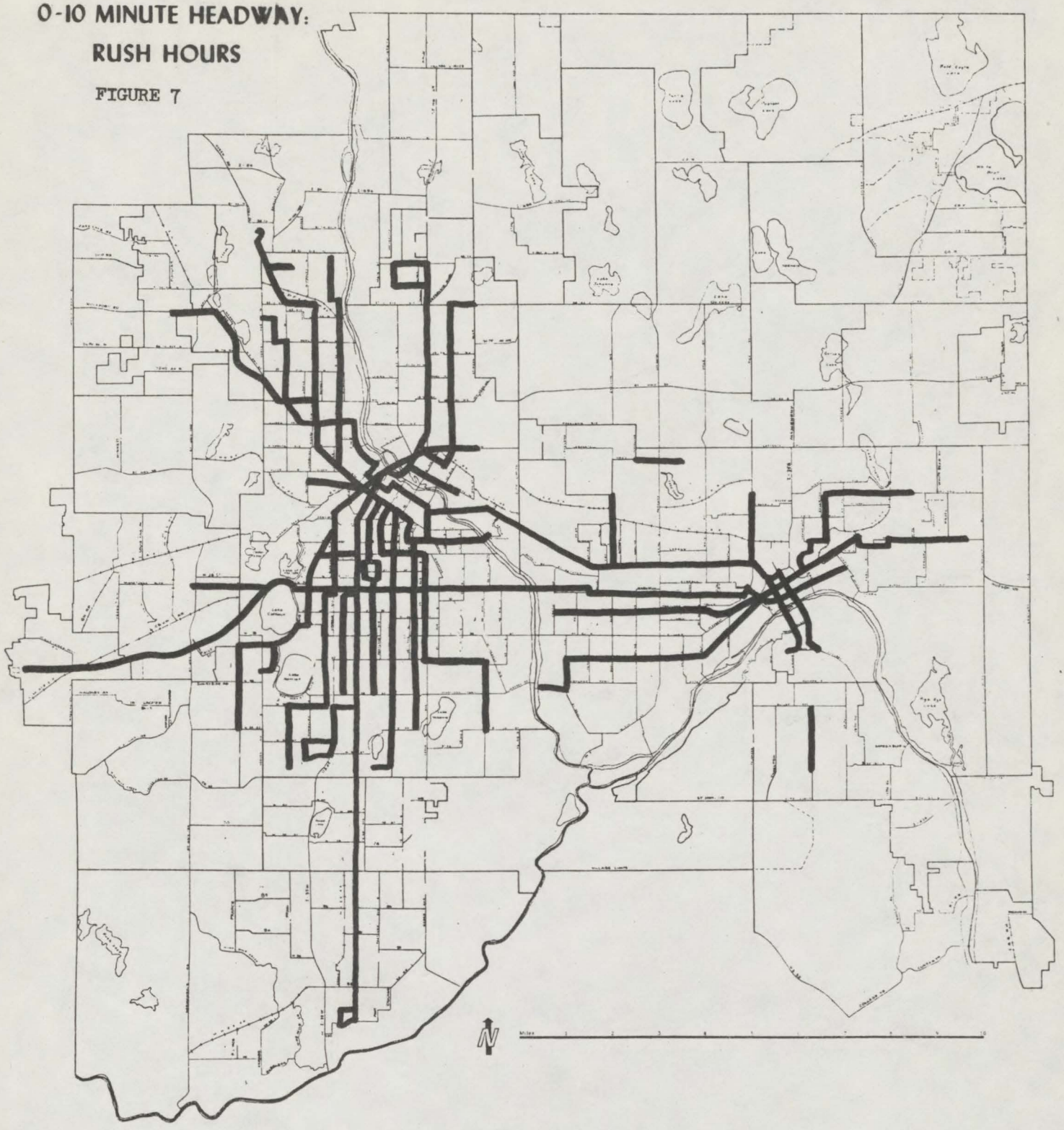
RUSH HOUR SERVICE, 7:00 a. m. to 8:30 a. m. and 4:00 p. m. to 5:30 p. m.

FIGURE 6



# 0-10 MINUTE HEADWAY: RUSH HOURS

FIGURE 7



**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

III. Daytime Off-Peak (aproximately 9:00 a.m. to 3:30 p.m.). As with the peak periods, we differentiate three types of services which are basically parallel to those mentioned above.

1) Frequent: These are the only routes that operate fifteen-minute headway or better. They include:

#3A Grand
#3 E. 3rd St.-Maria (to 3rd and Maria)
#4 Bryant (50th & Penn)
#5A Chicago
#5 Fremont (to Broadway & Fremont)
#6A France
#6H Xerxes
#6 Como (to 15th and University S.E.)
#8 Franklin (to Franklin and East River Road)
#8A Lyndale
#9B 4th Avenue
#9 Glenwood (to Glenwood and Cedar Lake Road)
#13 Intercampus
#14 Payne (to Maryland and Prosperity)
#14B Randolph
#16A University
#17A Nicollet-Hennepin
#18B Nicollet
#18 Monroe-2nd Street (to Central and Ordman)
#21A Selby-Lake.

2) Medium: These include almost all the remaining city routes not listed above. Some suburban services are also included (see map). As a rule, medium headway is 20-30 minutes. Most Minneapolis-based services are 20 minutes; St. Paul services are 30 minutes; suburban services may be either.

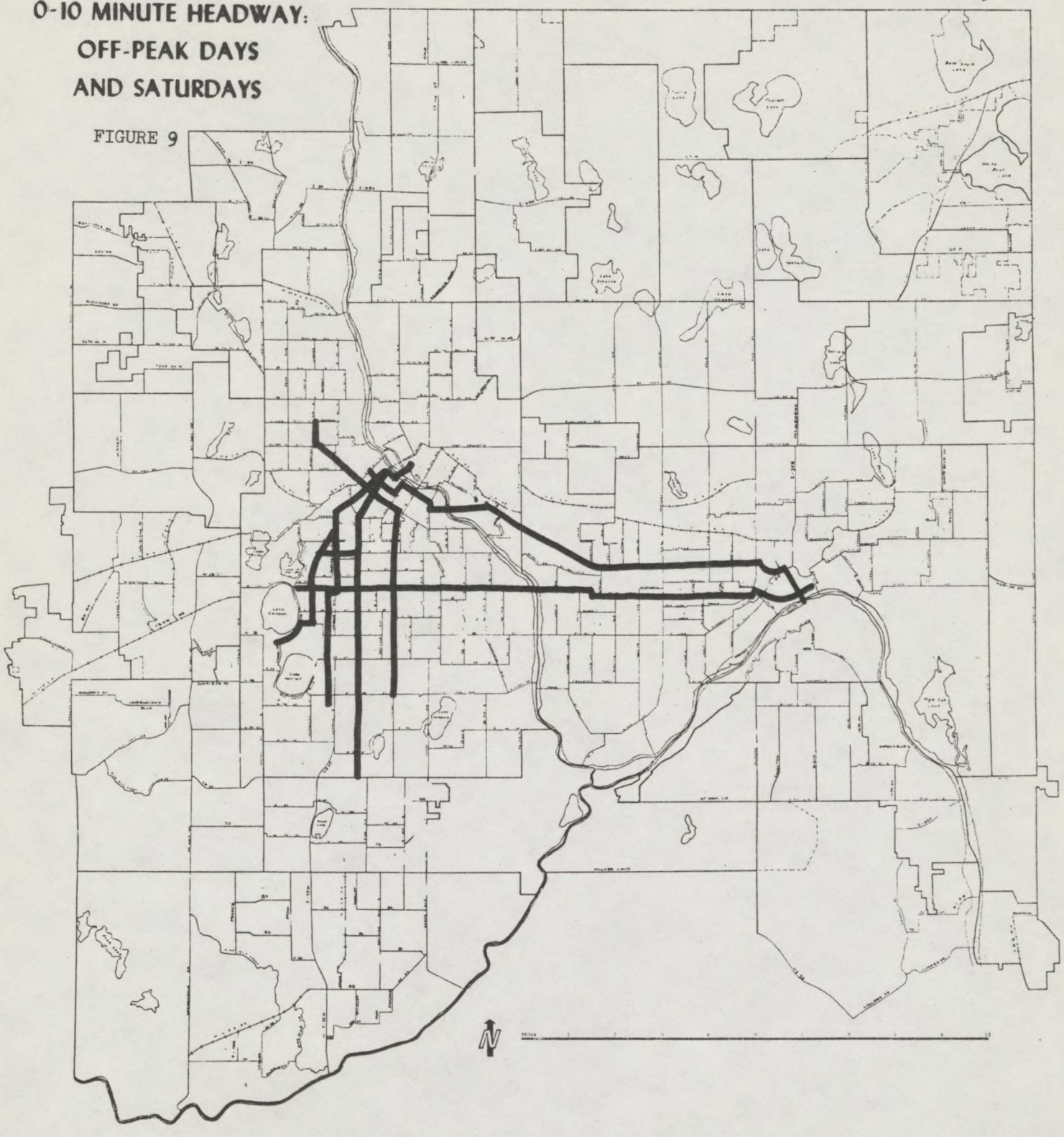
3) Infrequent: Any headway in excess of 30-35 minutes may be characterized as infrequent. Within the central cities, only the lighter cross-town routes and an occasional branch in the far corner of town will have such service. Infrequent service is far more common in the suburbs. By the time services reach there, they may have experienced several branchings and cutbacks. Forty to sixty minute headway is very common.

## DAYTIME OFF-PEAK SERVICE, 9:00 a. m. to 3:00 p. m.

FIGURE 8

# 0-10 MINUTE HEADWAY: OFF-PEAK DAYS AND SATURDAYS

FIGURE 9



**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

The MTC Standards of Service calls for not less than hourly service on all lines with the exception of expresses and special industrial services. Yet 34 portions of route fall short of this standard. They include in Minneapolis:

#1B Kenwood - one midday trip.
#1C St. Anthony - RH only.
#2B Franklin - RH only.
#3B Broadway: 70 minutes - plus gaps in a.m. and p.m.
#4K Bryant: 66-168 minute gaps.
#4F Johnson - RH only.
#5F Fremont - one midday trip.
#6M Brookside - RH only.
#8F Franklin - two midday trips.
#8D Lyndale - RH only.
#9H Bryn Mawr - several 90 minute gaps.
#10G Central - RH only.
#10K Central - RH and Ltd. OP.
#12C Hopkins - one midday trip.
#12D Hopkins - several 85 minute gaps.
#12B Hopkins - 100-120 minute gaps.
#14C & M Robbinsdale - one 74 minute gap.
#17B St. Louis Park - one midday gap.
#17G St. Louis Park - RH only.
#18D 2nd Street NE - 120 minute gaps.
#19B Olson - 80 minute gaps.
#19D Olson - 80 minute gaps.
#20C East 25th Street - 120 minute gaps.
#25 Mounds View-Blaine - RH and Ltd. OP.
#26 West River Road - RH and Ltd. OP.
#27A East River Road - 90-130 minute gaps.
#27B East River Road - RH only.
#27N East River Road - one OP trip only.
#28 Mounds View - RH and Ltd. OP.
#28B Circle Pines -RH only.
#51 Mound.

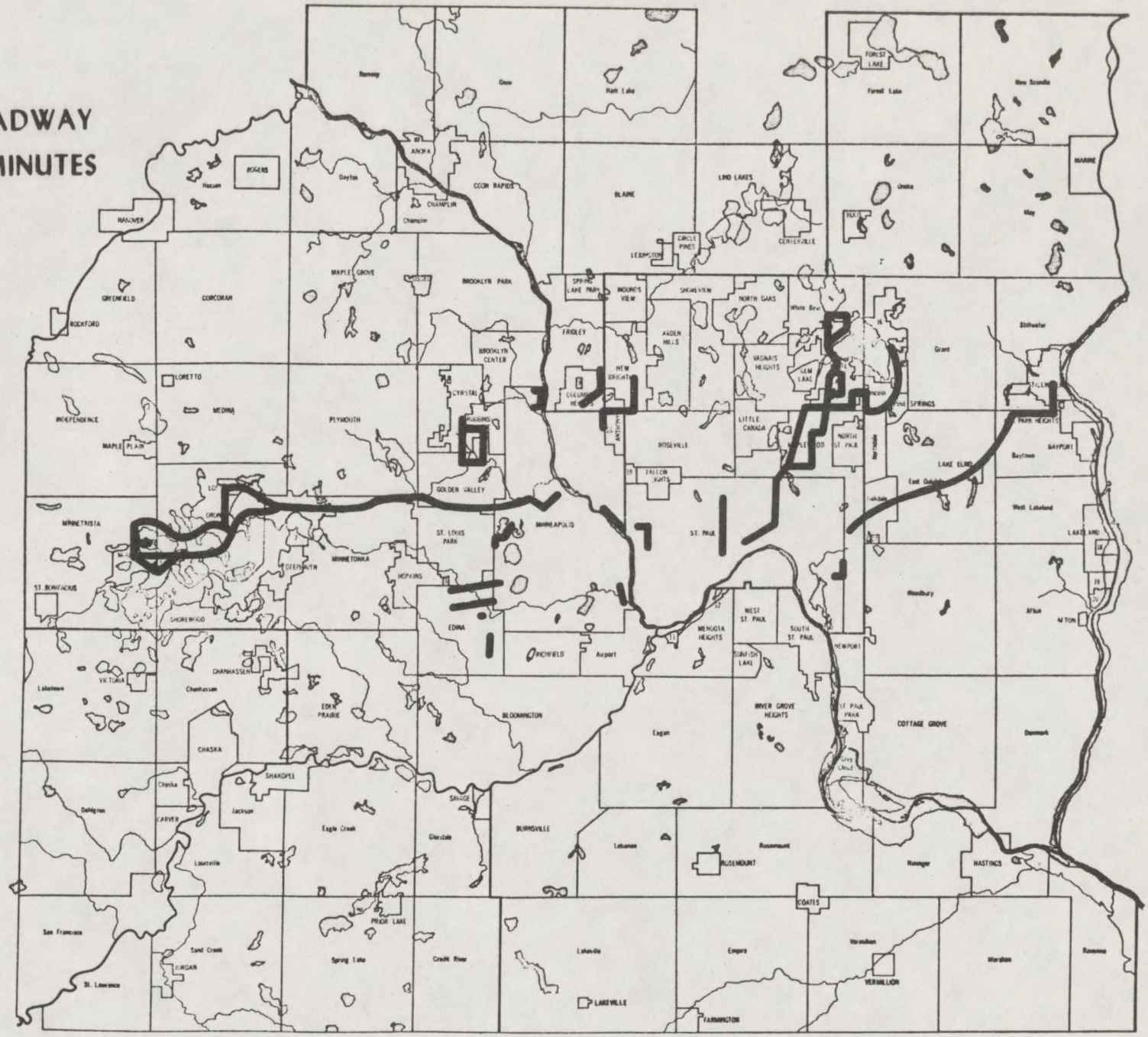
In St. Paul:

#3B East 3rd Street - two midday trips.
#3F Maria - 120 minute gaps.
#5C Como - RH only.
#6A Dale - RH only.
#11B Arkwright - one midday trip.
#12C & J East 6th Street - two midday trips.
#12D & K Stillwater - one midday trip.
#12C & J Roseville - RH only.
#12D & K Roseville - one midday trip.
#15ABC&D-RH only.
#16E Raymond - RH only.
#21B Desnoyer Park - one midday trip.

## ROUTES WITH HEADWAY IN EXCESS OF 60 MINUTES

FIGURE 10

MINOR CIVIL DIVISIONS, 1960



4) Evenings: Evening service is more sparce than during the daytime. Many suburban routes and some in-city crosstowns close down entirely after 6:30 p.m. In some cases, the only evening suburban service are the Monday and Thursday night extras that run because the downtown stores are open on those evenings. This applies especially to the private suburban bus companies. There is little 15-minute headway during the evenings. It is restricted to three lines.

Evening service is divided into two distinct periods, roughly the 6:00-9:00 p.m and 9:00-2:00 a.m. Six-to-nine p.m. headway is almost as good as off-peak days, except that the frequent lines cut down to medium headway in some cases. After 9:00 p.m. service drops off to 30-60 minute headway until about one a.m. Thereafter, the buses start pulling into the garages; the last one arrives about two a.m. From 2:00-4:00 a.m. there is no service.

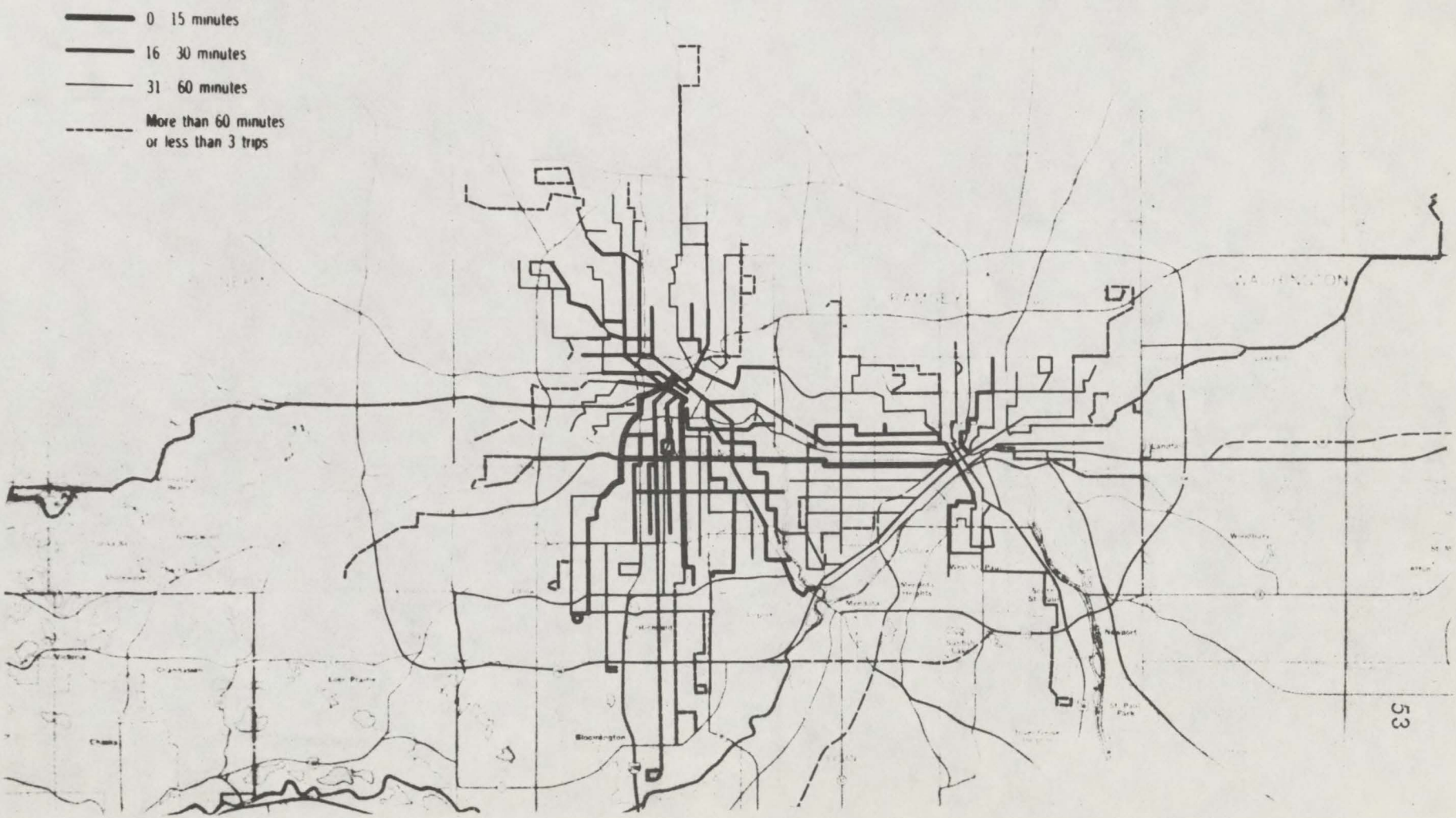
5) Saturdays: Saturday service closely resembles weekday service without the peak hour extras.

6) Sundays: Sunday service is basically a bare-bones skeleton of the system. The private bus companies do not run at all. MTC suburban service is greatly reduced; there is none to Richfield and Bloomington, for example. Only #5 Chicago-Fremont has 15-minute headway. Either 30-or 60-minute intervals are the rule otherwise.

Making improvements in headway is difficult to justify economically. Improvements would obviously attract some new ridership, but would the increase be enough to offset increased operating costs? We do not pretend to know that answer; the question is beyond the present scope of this report. We do realize that most early morning, evening, crosstown, Sunday, and Holiday runs do not make a profit. Their losses are

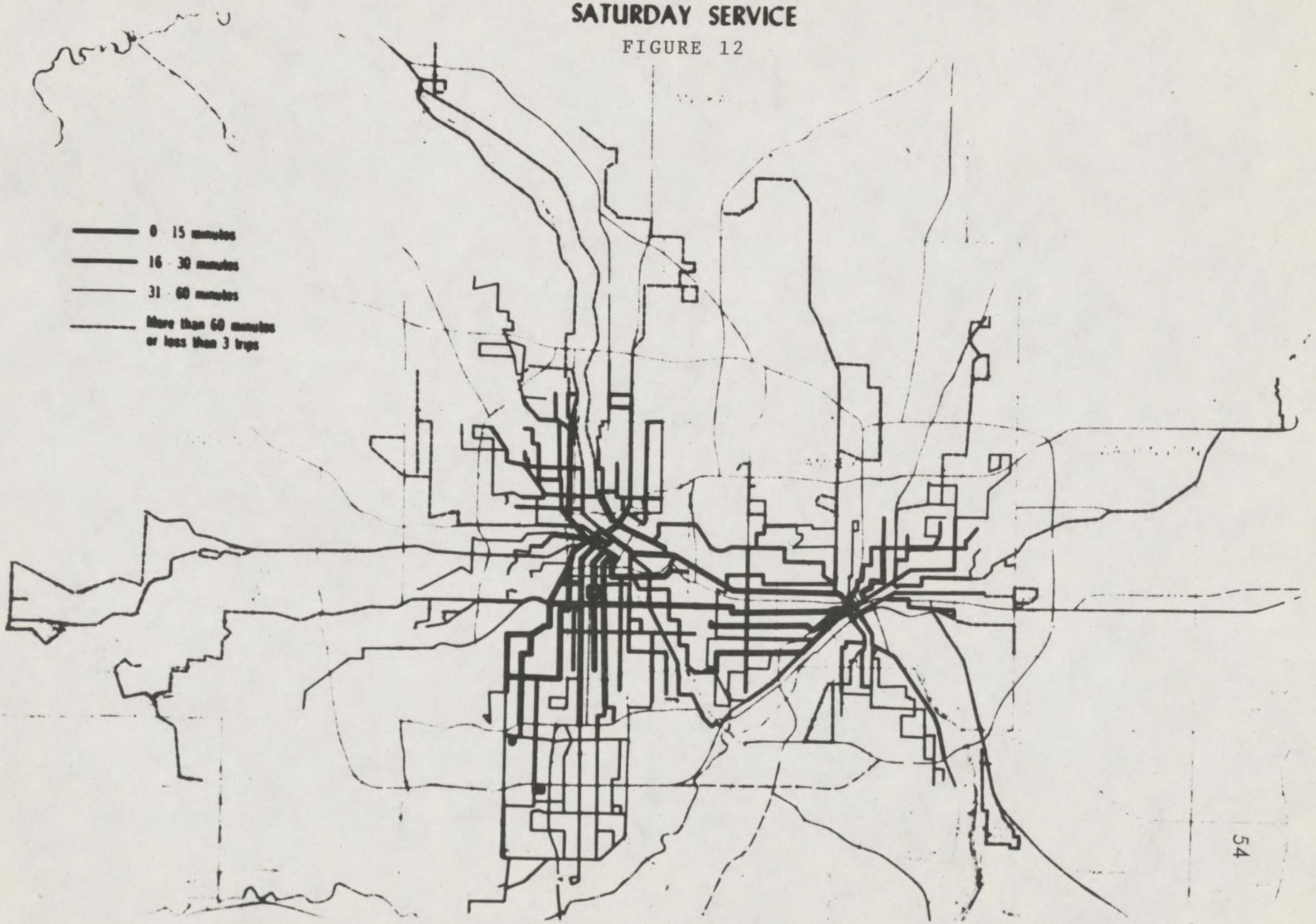
## EVENING SERVICE AFTER 7:30 p. m.

FIGURE 11



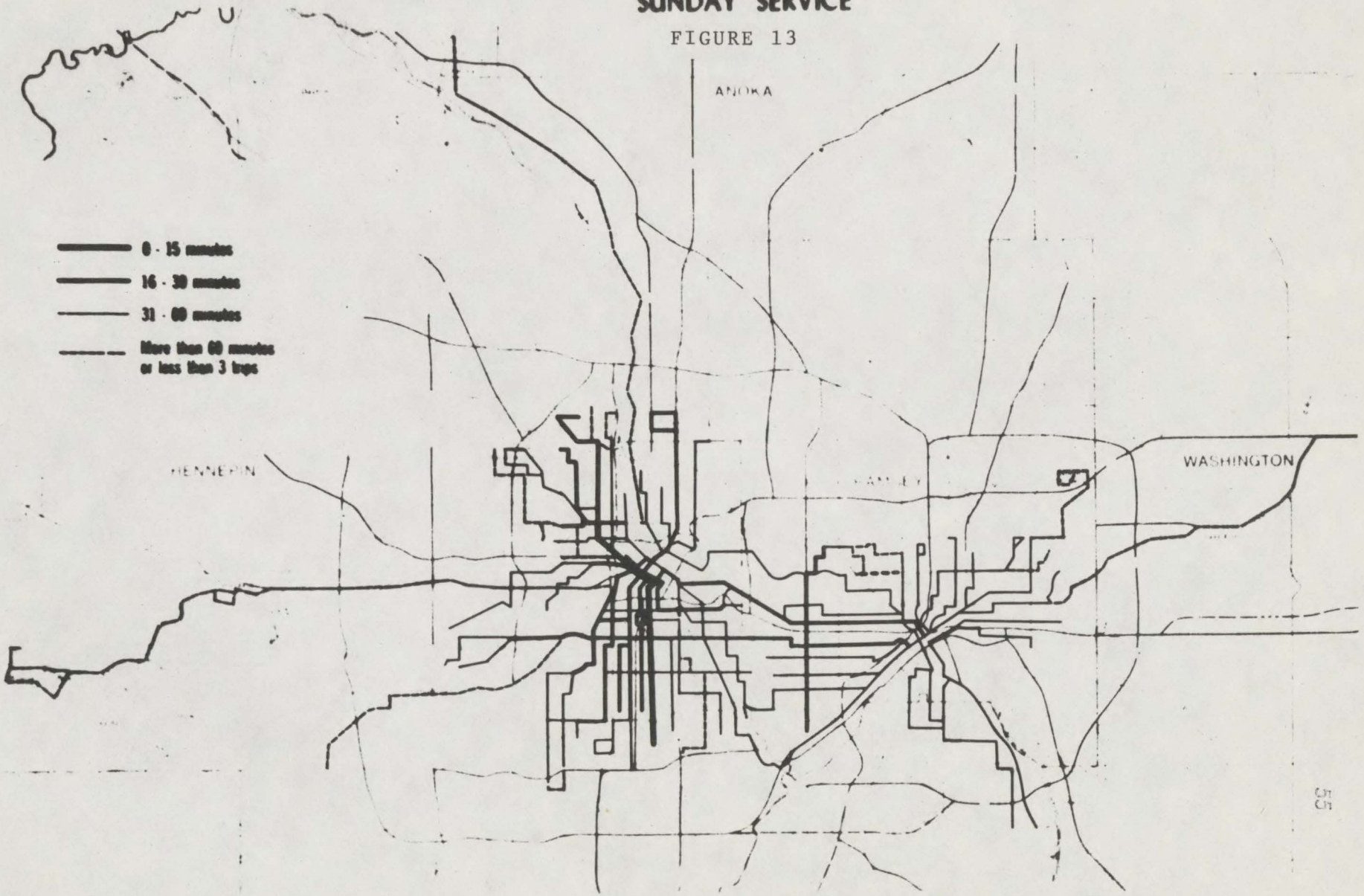
## SATURDAY SERVICE

FIGURE 12



## SUNDAY SERVICE

FIGURE 13



covered by the profits from the heavy lines plus various governmental subsidies. Yet we do feel that some general recommendations can be made.

First, we agree with the MTC Standards of Service that hourly headway is necessary to provide even the most basic kind of access. Many of the extremely infrequent services cited earlier are impossible to use for anything but rush hour commuting. Those off-peak trips that are available do not begin to serve the public's most basic travel needs. For example, consider #12 C & J, which terminate at Rosedale. There is no service from 9:40 a.m. until 2:40 p.m., followed by a gap until 4:30 p.m. In this age of automobile convenience, only the most determined captive transit rider would even attempt to shop by bus at Rosedale. A profit cannot be guaranteed from hourly service to this center, but MTC can be assured of a loss under the present schedule.

Secondly, there are several cases where service is cut in half just short of a large suburban shopping center, in deference to traditional terminals at the city limits. Often the gap is only half a mile. Three fares per round trip would pay for the extension. We believe that sort of return can be reasonably expected. The routes and centers involved include; Brookdale (#5 and #14), The Hub (#18), Southdale (#6), Har Mar - Rosedale (#4 and #12), Apache Plaza (#4), Highland Village (#20), and the University of Minnesota (#2).

The headway improvements listed above are basic and inexpensive. They should be implemented under any financial circumstances. Should more subsidy money be forthcoming, shorter headways could be effected system-wide. Ideally, every line should run every five minutes, 24 hours a day. This would be very expensive in terms of current transit budgets, but surprisingly cheap when compared with enormous sums that

are spent on automobiles and highway improvements in this metro area.

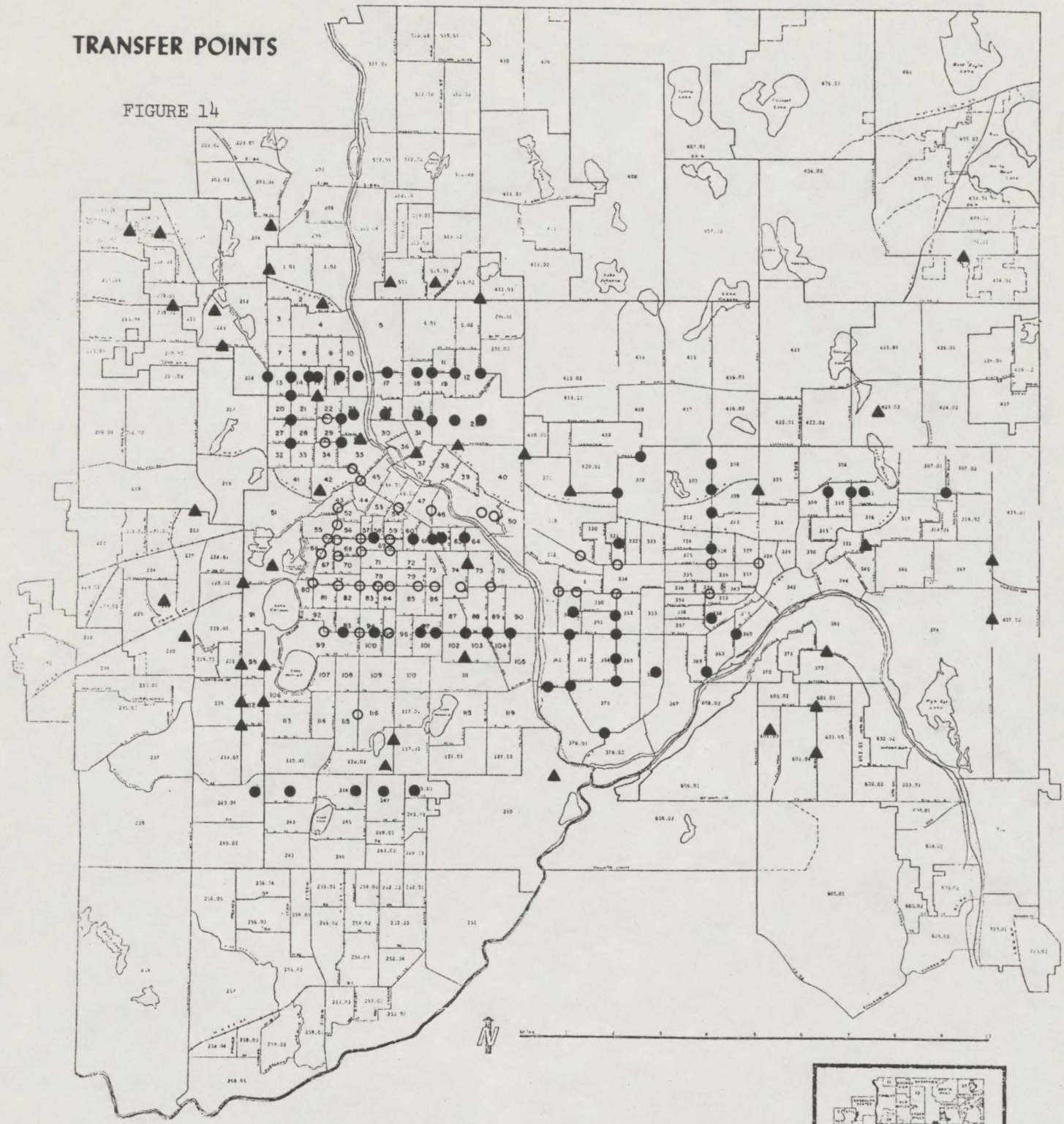
If all bus trips required but one bus from origin to destination, headway problems would be no more complex than described above. Unfortunately, it is impossible to route buses to serve all riders without transferring. Transfers are an inconvenient fact of life. All that a bus operator can do is attempt to minimize the amount of time a passenger must wait between buses. This amounts to solving the whole headway problem over again, but with complications.

To begin with, 15 minutes is longer than most people want to wait for a transfer. A number of modal split formulae we have seen give an optimal transfer time of one-half the headway on the given route. Carried to its logical extreme, that is an impractical measure. No one would wait half of 60 minutes, perhaps not even half of 30 minutes. Instead, we would propose that half of a person's desired waiting time for the first bus (as indicated on the Suburban Transit Survey) would be a more accurate figure, in other words 7.5 minutes. That is an unwieldy number, though, and we would prefer to work with ten minutes. Hereafter, a "good" transfer will imply one that is ten minutes or less.

There are a number of ways to arrange transfers, and these are largely dependent on the headway of the lines involved. As headway decreases, so does transfer time, as does the amount of care that must be taken to properly choreograph the transfer. Where two lines that have ten-minute headway cross, a good transfer is guaranteed in all cases (see Figure 14). When a ten-minute line crosses a less frequent line, the situation is almost as good. Transfers to the frequent line will always be good. If a schedule is consulted, a good transfer to the less-frequent line can always be obtained. The rider must merely

## TRANSFER POINTS

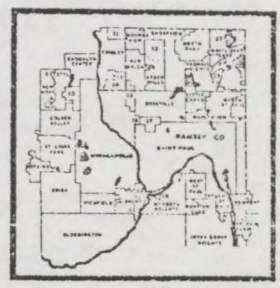
FIGURE 14



▲ No service by 10-minute headway routes

● Served by proposed 10-minute routes (crosstowns)

○ Served by existing 10-minute routes



select the frequent bus that will arrive within ten minutes of the less-frequent bus.

When both lines have more than ten-minute headways, the situation becomes more difficult. There are eight possible transfer combinations at every junction. Two ways exist to serve all combinations.

1) All four buses converge on the intersection at once. The drawback to this plan is that a great deal of precision is needed to effect such a simultaneous meeting. Unless the buses all wait for each other to arrive, one or more of them is very likely to miss the connection by a block or two. A more successful device is the predetermined wait, where all the buses remain at the intersection until all passengers have been exchanged. This is an irritation for the through passengers, but it guarantees a short transfer. Practiced by MTC mostly in the early morning and late evening hours, this method takes on major proportions in the downtowns, where up to 25 intersections and 16 routes may be involved. The buses work their way from corner to corner, and the process takes five to ten minutes.

2) Where two 15-or 20-minute routes cross, a good transfer may be obtained in every case. The buses of each route must cross at exactly midway through the interval of the other. This results in uniform 7.5- and 10-minute transfers respectively. (See figure 14).

The unstated requirement for the above methods to work is that the crossing routes have uniform headways, if over ten minutes. That is entirely possible to do, but may create an unbearable cost should a 60-minute service have to be upgraded to 20 minutes. A valid compromise is to make all less-frequent headways multiples of the more frequent headways. Thus, to use the most complicated example of downtown Minneapolis, the current mixture of 15, 20, 30, and 40-minute

services would become 15, 30 and 60, or 20 and 40. Thus the less-frequent routes would always connect to every second or every third cross bus. Such a system, combined with a predetermined wait, is the best solution for the complex downtown transfers. However, it is unlikely the passengers will be patient with predetermined waits at every transfer point outside the CBD. For example, there are seven such points on #5 Fremont, six on #6 France, and four on #3 Grand. Crosstown routes have about twice as many transfer points.

There are currently 143 non-CBD transfer points. Of these, 37 are served by at least one ten-minute line during the daytime off-peak, so a good transfer is assured. The rest pose a problem. Current schedules either attempt to serve the transfer combinations that are more in demand or simply make no effort to coordinate the two lines at all. The result is that restrictions are placed on where the rider can go with convenience.

The question to be asked is, "Which lines, if given ten-minute headway, could cover the most transfer points at the least cost?" The answer is the crosstowns. There are currently nine of them. One of them, #21 Lake, already has 8-10 minute frequency. The others cover a total of 52 points that are not already served by a ten-minute line, yet all are short. The range is from three miles (#6 Dale) to six miles (#11 Lowry).

A further compromise is possible where the crosstown crosses nothing but 30-minute lines. This is nearly the case with #6 Dale, #7 Highland, and #15 66th Street. If all crosslines were brought up to that frequency, the following would work. Cross buses must be scheduled to pass the transfer point at the same time in both directions. A crosstown bus would pass five minutes earlier, leaving off passengers who would

wait five minutes to be picked up. Another crosstown bus would come along ten minutes later, or five minutes after the 30-minute buses, to pick up the passengers they had left off. Twenty minutes would then pass before this cycle would repeat. Thus the crosstown would run alternating 10 and 20-minute headways, less expensive than uniform ten-minute service.

With the increase in ridership since the MTC administration, there may be lines that are candidates for 10-minute service because they are currently overloaded. Candidates include #3 Grand, #5 Chicago (from 48th and Chicago to 57th and Chicago), #6 Como to the University of Minnesota, #8A Franklin-Lyndale, #9A Glenwood-4th Avenue, #14 Randolph-Payne (to Maryland and Prosperity), and #18C Nicollet. Should these be implemented, they would cover an additional nine transfer points. Added to the above improvements, that would raise the ten-minute points from 37 to 98.

D. Fares.

Current Levels.

MTC fares range from 0¢ to 85¢. Since the beginning of 1972, senior citizens have ridden free during off-peak hours because of financial assistance from the state Legislature. This law also covers all private bus operators. The lowest MTC fare is 10¢ on the four downtown QT routes. The next lowest is the student fare, 10¢ off the normal adult fare for school children with ID's. The system-wide adult base fare of 30¢ will purchase a ride within Minneapolis, St. Paul, or the suburbs (there are some exceptions to the latter). The 30¢ city ride is potentially up to two miles longer than its suburban counterpart,

though this difference may be equalized in the future as suburban route miles increase.

Extra-fare zones are usually entered at municipal boundaries. Where none are available, arbitrary points roughly equidistant from one another are used. The first zone out from the CBD's is always 10¢. Additional increments follow no particular rule, they may be 5¢, 10¢, or 15¢. These inconsistencies developed during the haphazard growth of suburban mileage prior to MTC management. This lack of a system has caused discrepancies in express bus fares as well. In some instances, a premium of 5¢ over the normal fare is charged. In other cases there is no premium. In the case of the two University Express routes to St. Paul, the express fare is 10¢ less than the exorbitant Minneapolis-St. Paul double fare.

Fares charged by private operators usually compare to the MTC fares for similar distances, despite some differences. In South St. Paul, MTC and St. Paul South and West Transit buses run on the same street in direct competition with each other. SPS&W charges 5¢ less than MTC. In contrast, Bloomington Bus Company charges 5¢ more than MTC between Minneapolis, Richfield and Bloomington.

The suburban operators are also more lenient than MTC in the area of student and children's fare discounts. There are only two examples of adult discounts in the entire Metropolitan area. MTC continues to sell multi-ride ticket books at about a ten percent discount on the #51 Mound. This policy was originated by Zephyr Lines, when that company still ran the route. Medicine Lake Lines offers not only multi-ride discounts, but tokens at a discount as well. There is currently no provision for getting free transfers between buses of different companies, with one exception: patrons of the University Expresses may do

so. (However, this situation may soon be remedied.)

Recommendations.

Planning a uniform and equitable fare structure is impossible to do without creating such complexity as to deter ridership. MTC has addressed itself to this problem and has narrowed the possibilities down to two. Briefly stated, they are as follows; 1) A large, capsule-shaped, base fare zone created by drawing overlapping six-mile radii circles around each CBD. Each successive two-mile radius would add a dime to the fare. This system would eliminate some existing fare discrimination created by the oblong dimensions of Minneapolis and St. Paul. Fares would be lowered between Minneapolis and St. Paul, Minneapolis and Golden Valley-St. Louis Park, and between St. Paul and West St. Paul-South St. Paul. The use of the six-mile base radius would also bring the centers of Brookdale, Rosedale, Southdale, Apache, and Signal Hills within the base zone. This would end a particularly antiquated fare discrimination.

2) No zones at all. A flat fare would be charged regardless of distance.

What are the advantages and disadvantages of the above plans? According to MTC's own research, both plans would result in a net revenue loss given the present base fare of 30¢. The zone plan would charge long-run suburban passengers a fair rate per mile, but would entail up to eight extra fare zones if applied strictly. Perhaps a single long-run zone after the fifth or fourth extra dime could be used to simplify matters. Nonetheless, computing fares would remain unattractively complex.

The flat fare plan is beautifully simple. Its only drawback is its obvious discrimination against the short distance rider, who must in

effect subsidize the long distance rider. This would not be so objectionable if most of the short trips were not made by low income city residents, and the longer trips made by the more affluent. This situation would be aggravated if it also required a fare increase to 35¢.

This report favors neither plan over the other. Our concerns are as follows:

1) that the Minneapolis-St. Paul double fare be eliminated. It is grossly unfair. We would not be surprised if the resultant increase in riders would offset the loss of revenues;

2) that the basic fare zone be no smaller than a six-mile concentric circle around each downtown. This would eliminate the inequities caused by the oblong shapes of Minneapolis and St. Paul;

3) that the following suburban centers, because of their close proximity to the central city limits, be included in the base fare zone: Apache Plaza, Brookdale, downtown Robbinsdale, Golden Valley, Knollwood Plaza, Miracle Mile, Southdale, the Hub, Signal Hills and Rosedale;

4) that free transfer agreements be negotiated among all the bus operators;

5) that the following major employment centers be placed within the base fare zone: General Services Administration Building at Ft. Snelling, Methodist Hospital, Turner's Crossroad, General Mills, Golden Valley Honeywell, FMC Corporation Space Center Park, 3M Headquarters, North Star Steel, South St. Paul Stockyards, and the Mendota Heights industrial development;

6) that cash substitutes and multi-ride discounts be tried out.

Aside from the question of overall fare structure, there exists another area that must be considered - namely, stopover privileges. Cus-

tomarily a fare is paid every time one enters a bus when no transfer from another bus is involved. That is acceptable so long as the rider plans to conduct no business at any intermediate point. It is possible to do a certain amount of stopping over on a transfer, but the limitations are clear. The desired stopover point must coincidentally be a transfer point. The transfer itself expires within an hour as a rule, and in many cases lasts a shorter period than that. After the stopover, travel must continue in a different direction than before or the rider must pay again. It is not hard to see how the fares mount up, and how these extra fares discourage riders from using transit for multi-stop trips. This report contends that MTC could tap a new market if it would incorporate a more lenient stopover policy into its fare structure. We are not suggesting that MTC risk a net loss in revenue.

We propose a pass good for a certain period of time no shorter than one operating day. It might continue in effect for a week, month, or year. All four time units might be offered; a great deal of latitude exists. The important aspect of the pass is that it decreases the overall cost to the patron while keeping MTC's revenues at the same or higher level than before. To determine the cost of the one-day pass, one must calculate the number of rides the customer would ordinarily take, and the increased number he would take if allowed some sort of discount for multiple trips. The first figure is two; most bus patrons make one round trip per day. This then is the base; the pass per day cannot cost less than 60¢, or two fares. The second figure, the number of stopovers, is more difficult to arrive at. It may be three, four, or five; but probably not much larger. The cost of the pass should fall somewhere in between, perhaps 2.5 or 3 fares. In any case, it

must offer a savings. Hopefully it will attract new business as a result.

E. Schedules and Information Services.

According to the Suburban Transit Survey, most of the respondents preferred that two sources of schedule information be available to them: 1) a telephone information service, and 2) a schedule in hand or posted at the transit stop. Each makes the use of the other easier. An information operator can clarify times which the caller finds on a pocket schedule; by consulting a schedule first, the caller can ask questions that are more to the point.

Both of these services are currently available to some degree; that much is a credit to the MTC. Under private management, the telephone information operator was virtually inaccessible. According to a call survey made by the phone company prior to MTC's administration, a caller could expect to wait 45 minutes to reach an operator. MTC has greatly increased the number of operators on duty at any one time and now claims an average delay not in excess of 45 seconds. In the course of one day, the operators handle some 3000 calls.

Bus Stop Posting.

Bus stop schedules were almost nonexistent under Twin City Lines; there were very few in the entire metropolitan area. On a more basic level, bus stop indicators were not to be found in many parts of the city and in most of the suburbs. MTC has been carrying out a program of bus stop marking. Most stops, because they are served by only one line, receive the familiar red circle-T sign. Stops for more than one route receive a somewhat larger sign with the T-logo and route numbers. Downtown stops feature a nine-foot high clear plastic sign with maps and service frequencies listed on it. (This will be discussed in more

depth later in the report.) The new signs have made the stops more visible; unfortunately, deployment has been spotty. It is not unusual to follow a bus route and see some stops with signs and some without. This is disconcerting for the rider who is not sure that buses will stop at unmarked intersections. The problem is aggravated on lines that cross narrow blocks and stop at every other one only. One reason for this incomplete coverage seems to be attributable to the municipal workers who post the signs. The MTC should be more cognizant of this problem.

At the downtown stops, there are two basic schedule formats. The first is used in the tall signs, the second in the display windows of the shelters erected on the Nicollet Mall.

1) A table showing frequency of service for each route during each different headway period of the day. First and last departure times of the day also appear.

2) A separate boxed space for each line encloses a list of departure times by weekdays, Saturdays, and Sundays. After each time is the letter indicating the terminal of that particular bus.

Given the choice between the two, this report unquestionably favors the latter. It is much more straightforward; one has only to look down the column and find the appropriate time. The other table is difficult to use. It requires a mental computation to figure a departure time. This is more work than most people want to do, so they don't use the schedule at all. We would retain the maps displayed in the nine-foot-high signs. Americans are accused of being cartographic illiterates, and we acknowledge that there is no way to make a simple bus map. Even so, it is a tool that should be made available, and the MTC has made their maps about as readable as possible.

Eventually every stop should have an individually worked out list of departure times. For the present, however, that goal deserves the low priority to which it has been assigned, in view of all the other improvements that need attention. Shelters have been erected at the busiest non-CBD stops, a situation that lends itself to displaying schedules, yet not even a pocket schedule has been taped to the walls.

Often there are schedule problems that are beyond the capability of the rider or the telephone operator to comprehend. The rider's problem will be one of ignorance of all the options available to him. The telephone operator will be handicapped because of working under definite time constraints that do not allow the coordinating of all possible route options, especially when transfers are involved. To handle such situations, we propose a custom scheduling service that would work by either phone or mail. A questioner could phone or write his question, with the scheduler delivering the schedule by phone or mail as soon as possible.

To help the patron perform his own scheduling, we further propose that a Master Directory of all routes be published. Having made that decision, there are various ways to implement such a project. The book might come out monthly, bi-monthly, quarterly, semi-annually, or annually. It might appear in the telephone directories. It might be a loose-leafed booklet to which new schedules could be added whenever changes took place. Advertising could be sold to defray expenses. Depending on the economics of it, the directory could be distributed free, or for a charge, or by subscription. In any event, we regard this as a useful tool for educating the public.

Pocket Schedules.

The whole question of pocket schedule graphics and information load

has also been given a low priority. The MTC should not be taken to task too severely for this. They are understaffed currently and have their work cut out for them for some time to come. Nonetheless, this report would be negligent if it did not point out the shortcomings of the present format and make suggestions for the future.

1) The present graphics appear crude. The MTC realizes this and has done some mock-ups of the present format using professional bold-line graphics. This report does not doubt that future graphics will be quite attractive, in view of MTC's publicity efforts to date.

2) Current route maps neglect to show connecting services in the following cases:

In Minneapolis:

#1- 4 at 37th and Stinson
4,6 at Douglas and Hennepin

#2- 16 at Oak & Washington
8 at 27th & Franklin
9 at 3rd & Franklin

#3- 14 at Broadway & Emerson

#4- 1 at 37th & Stinson
6,18 at University & E. Hennepin
6 at 50th & France

#5- 14 at Brookdale, Broadway & Emerson, Bass Lake & Broadway, and Bass Lake & Winnetka

#6- 15 at Southdale

#7- 11 at Lowry & Washington
9 at GSA Building

#8- 16 at 27th & University
2 at 11th & Franklin
5 at 44th & Humboldt
7, 11 at Lowry & Lyndale
3, 14 at Broadway & Lyndale
20 at Plymouth & Lyndale

#9- 2 at Franklin & 3rd Avenue
51 at Wayzata & Vernon

#10-2 at Franklin & Nicollet
6 at University & Central
1, 4 at Central & Hennepin
3 at Broadway & Central

#10-11 at Lowry & Central
18 at 40th & Central, 40th and University

#11-14 at North Memorial Hosp.
18 at Lowry & Washington NE

#12-2 at Franklin & Hennepin
6,17,21 at Lake & Hennepin

#14-5 at Brookdale, Bass Lake & Broadway, Bass Lake & Winnetka, Broadway & Emerson.
11 at North Memorial Hosp.
3 at Broadway & Emerson
22 at 24th & Bloomington

#16-5 at Como & Raymond
6 at Dale & University
2 at Cedar & Washington

#17-2 at Franklin & Nicollet
4 at 24th & Lyndale
6,12,21 at Lake & Hennepin
12 at Excelsior & Alabama

#18-2 at Franklin & Nicollet
3 at 13th & 2nd St., NE.
11 at Lowry & 2nd St. NE, Lowry & Washington NE
10 at 40th & Central, 40th & University
6 at 4th & Central

#19-14 at 36th & Noble, 42nd & Douglas

#19- 3 at Golden Valley & Penn, Golden Valley & Xerxes
20 at Plymouth & Penn
22 at 42nd & 28th Ave. S.

#20- 19 at Plymouth & Penn
5 at Plymouth & Fremont
8 at Plymouth & Lyndale
7, 14 at Plymouth & Washington

#21- 6, 12, 17 at Lake & Hennepin
4 at Lake & Lyndale
9 at Lake & 4th Avenue
14 at Lake & Bloomington
7 at Lake & 27th Avenue
7 at Cleveland & Marshall

#22- 19 at 24th & Cedar, 42nd & 28th Avenue South

#25- 4 at 7th & Silver Lake
11 at Lowry & Johnson
3 at Broadway & Johnson

#26- 8 at 57th & Lyndale
8 at 42nd & Lyndale
7, 11 at Lowry & Washington
3, 14 at Broadway & Washington
20 at Plymouth & Washington

#27- 11 at Lowry & Marshall
3 at Broadway & Marshall
1, 4, 6 at 1st & Main NE

#28- 6 at Central & University
3 at Broadway & Central
11 at Lowry & Central
10 at 40th & 44th and Central
18 at 40th & Central

In St. Paul:

#3- 7 at Grand & Cleveland

#4- 12 at Hamline & Hoyt
9 at 7th & Davern

#5- 6 at Dale & Front
12 at Como & Rice
8 at Thompson & Robert
7 at Moreland & Robert

#7- 6 at Dale & Thomas
12 at Como & Rice
4 at Snelling & Minnehaha
9 at Cleveland & Ford
14 at Randolph & Edgecumbe
5, 8 at Robert & Moreland

#8- 7 at Robert & Moreland
5 at Robert & Thompson

# 9- 14 at White Bear & Maryland, 7th & Randolph
10 at 7th & St. Clair
7 at Edgecumbe & St. Paul, Ford & Highland
4 at 7th & Davern
7 at GSA Building

#10- 14 at Forest & Maryland

#11- 14 at Payne & Maryland
8 at Concord & State

#12- 6 at Dale & Maryland, Dale & Arlington
4 at Hamline & Hoyt

#14- 11 at Payne & Maryland
9 at 7th & Randolph
20 at Ford Plant

3) It is difficult and sometimes impossible to work out a transfer connection using existing pocket schedules. That is because the times given represent, as a rule, places that are about ten minutes apart, whether they happen to be transfer points or not. Inevitably, times for many transfer points are not given at all. The bus rider must somehow estimate these times. This is impossible in many cases, especially when he must estimate for both lines.

The upshot of this is, that having made an effort to decipher a complicated schedule, the rider finds the desired information still not forthcoming. There is no way to make a schedule simple, though its complexity may be reduced in some ways. All one can hope to do is make all the pertinent information available for those who want to find it. Thus we have two tasks: 1) to put into the schedule all pertinent information, and, 2) to simplify that information as much as possible.

Speaking of the first, what information should a schedule contain that present ones do not?

a. Times and map indications should be provided for all transfer points, with one general time for CBD transfers. This general time should be as close to 7th and Nicollet in Minneapolis and 7th and Wabasha in St. Paul as possible.

b. Possibly in lieu of times at all transfer points, elapsed time markings could be placed on the route map to show minutes between points A & B, B & C, etc.

c. Because figuring transfers is so cumbersome and potentially confusing using existing schedules, a quick reference indicator is needed to show when a good (0-10 minute) transfer is available. After some experimentation, we have settled on the following method:

Beside each time is room for a letter. The presence of a letter indicates that a good connection is assured. The letter itself (N,E,S,W) tells the direction the connecting bus will travel.

d. A situation map should be provided. Used in other cities, this is a simplified map showing a recognizable outline of the metropolitan area, or Minneapolis and St. Paul, and the situation of the route within that.

e. On the route map, north should always be "up" to the reader. At present, lines #3 Grand-Maria-East 3rd Street, #2 Franklin, #3 Broadway, #9 East-West 7th Street, #10 St. Clair-Phalen, #14 Randolph-Payne, #12 Stillwater-Roseville, #9 Glenwood-4th Avenue, #11 Lowry, #12 Hopkins, #16 University, #17 St. Louis Park, #21 Selby-Lake, #23 38th Street, and #51 Mound all fail to meet this standard.

f. The entirety of each line should be included on one schedule. Several of the larger routes require more than one schedule to encompass their entire length. They are (number indicates how many separate schedules): #3 Grand-Maria (2), #6 Como-Xerxes-France (3), #8 Franklin-Lyndale (3), #5 Chicago-Penn-Fremont (5), #18 Nicollet-2nd Street-Monroe (3), and #4 Bryant-Johnson (3).

How may schedules be simplified?

a. Eliminate all unnecessary branches and cutbacks. Among the 200 or more terminals currently listed on schedules, ten are not used. Approximately 60 more may be considered superfluous for various other reasons. (See Route Recommendations and Master Route Guide.) As for branches, there exist numerous cases where neighboring lines have unequal numbers of branches. In north Minneapolis, for example, #5 has four, while #8 has two. It is often possible to exchange branches between lines and thereby reduce complexity.

b. Do not permit branches of the same route to cross one another. This occurs on #3 Maria-East 3rd Street, #15 White Bear, and #6 Xerxes-France. It is extremely confusing.

c. Should fare zones be eliminated, several lines of explanatory type could be removed from each schedule. Benefitting particularly would be such routes as #15 White Bear, #10 Central, #12 Stillwater, #25 Blaine, #26 West River Road, #27 East River Road, #28 Mounds View, and #51 Mound, all of which have more than two zones to deal with.

d. No services should be segregated or boxed off apart from the rest of the schedule. These are usually special industrial services, or little-used branches. Setting them apart, with usually incomplete schedules of their own, is disconcerting to the patron. Currently such services include: #1G Industrial Blvd., #6 Southdale Office Center, #8B North Mississippi Drive, #9F Prudential Building, #12E Clear Springs, #12 Fingerhut, #19C Airport, #20C Soldiers Home, #3 Minnesota Mining, #21 B Desnoyer Park, and #10G & K Central.

e. Sometimes one schedule column is used to indicate two termini, with asterisks or other symbols displayed to note the difference. We feel each terminus should have its own column, regardless of how often it runs. Current examples of this are; #4D & H Johnson, #14J Robbinsdale, #4C & D Snelling, #4K and #4E & F Bryant, #6C & D France.

f. There are occasional "oddball" runs on Sundays, holidays, late evenings and early mornings that are difficult to describe using the regular route letters. Their purpose is to cover two branches with one bus during periods of extremely light service. They require more explanation than they are worth and should be eliminated. They include: #51 Mound- service on Hennepin Avenue and via the Minneapolis Greyhound Depot, #51 Mound- via Cty. 19 to Cty. 15, #14 Robbinsdale to 67th and

Winnetka, then 67th and Douglas via 63rd Avenue, #4 Bryant to 58th and Lyndale, #6 Xerxes- France, via 44th Street to France to 50th Street to Xerxes, #17 St. Louis Park via Minnetonka to Louisiana to Brownlow to Lake, #19 to 42nd and Douglas via Olson and Thomas, #14 Payne to Prosperity via Hazelwood, and #15 Mahtomedi to St. Paul via 15B loop in White Bear.

g. All Sunday and holiday schedules should be consolidated. There is too little difference between the two to warrant separate tables. Lines with separate tables include: #6 Xerxes-France, #8 Franklin-Lyndale, #9 Glenwood-4th Avenue, #14 Bloomington-Robbinsdale, #22 34th Avenue, #3 Grand- East 3rd Street-Maria, and #14 Randolph-Payne.

h. In view of the decreasing work week, increasing leisure time, and greater access to retail merchants on non-weekdays, Saturdays deserve service nearly equal to weekday base service. This situation already exists on many MTC routes. There are even a few instances of lines with better Saturday than weekday off-peak headway. Making this policy uniform for all lines will make it easier for regular patrons to commit specific departure times to memory.

i. Whenever possible, base headway should be uniform and predictable. This is the case on all but three MTC routes. These are #1 Kenwood-St. Anthony, #12 Hopkins, and #15 66th Street.

F. Route Deployment.

1. Local Service

The current MTC route network reflects the past far better than the present. The routes in large part are additions to the 1900-vintage, CBD-oriented streetcar lines. Most of the subsequent extensions have also lagged behind suburban growth. The Metropolitan Transit Commission

is far less to blame for this than were the former owners of Twin City Lines.

The account of the downward spiral of American public transportation is well-known and need not be retold here. Suffice it to say that from World War II to the MTC takeover in 1970, Twin City Lines lost three-quarters of its ridership (200 million to 50 million annual riders). Americans became automobile crazy. Beset by fierce competition, the company retreated to its CBD strongholds to wait out the storm. The suburbs held and continue to hold risks and few profits for any transit operator. Much of the suburban route mileage was run by small independent companies. These operators had two advantages over the Twin City Lines: 1) they could use non-union labor; and 2) most of them had other sources of revenue to help cover losses. These were, and in some cases still are, the following:

School buses: Medicine Lake Lines, Bloomington Bus Company, Rice-Edgerton Lines.

Taxicabs: St. Paul South and West Transit, Valley Transit.

Other bus operations: Richfield Bus Company (Rochester Minnesota City Lines, Sioux Falls Transit), Zephyr Lines (inter-city highway coaches).

Since the MTC takeover, changes have occurred. One by one the private operators are either being purchased or subsidized by the MTC. North Hennepin Transit, Zephyr Lines, and Dickenson Lines have sold out. Rice-Edgerton Lines, Valley Transit, and St. Paul South and West Transit are all receiving some sort of subsidy. Only the Bloomington Bus Company, Medicine Lake Lines, and Richfield Bus Company continue to be entirely independent. However, MTC recently mailed, free of charge, Medicine Lake and Bloomington schedules to residents in their ridership areas.

Bloomington Bus is also operating a University Express that is publicized as an MTC operation. The only company that will probably stay independent is Richfield Bus Company.

Absorption of private operators has created only a portion of MTC's new route miles. Since its administration began, the following local services have been added or created:

In Minneapolis:

1) #2 Franklin - entire line created, five miles.
2) #4 Johnson - created 4B branch, 1/2 mile.
   - created 4F branch, two miles.
3) #4 Bryant - extended 4K, 1/2 mile.
   - created 4D (to NW Finance Center) branch, 3/4 mile.
   - created 4F branch, 1/4 mile.
4) #5 Fremont - extended 5B branch 1/2 mile.
   - extended 5D branch, 3 miles.
   - created 5F branch, 4 1/2 miles.
5) #6 Xerxes-France - created 6E&K branch, three miles.
   - created Community Credit branch, 1/2 mile.
6) #9 Bryn Mawr - extended 9H, 1/4 mile.
7) #10 Central - extended to Northtown Center, four miles.
8) #10 Grand - extended 10A, 1/4 mile.
9) #11 Lowry - created entire line, six miles.
10) #12 Hopkins - created 12C branch, one mile.
    - created 12E branch, two miles.
11) #14 Robbinsdale - created 14J branch, 2 1/2 miles.
    - extended to Brookdale, 1 1/2 miles.
12) #17 St. Louis Park - extended to Hopkins, 1/2 mile.
13) #22, 34th Avenue - extended 22B, 1/4 mile.
14) #24 Glenwood Projects - created entire line, 1 1/2 miles.
15) QT Mall - created entire line, one mile.
16) QT 4th-5th Sts. - created entire line, 1/2 mile.
17) Former Dickenson services;
    #25 - created nine new miles.
    # 8 - extended 1 1/2 miles.
    #10 - extended 1 1/2 miles.
    #27 - extended 1/2 miles.

In St. Paul:

1) #2 Arlington-Arkwright - created entire line, five miles.
2) #3 East 3rd St. - created 3C branch, 2 1/2 miles.
   - extended 3B branch, 1 1/4 miles.
   - created 3F branch, two miles.
3) #5 Stryker - extended 5B, 3/4 mile.
   - created 5C branch, 1 1/2 miles.
   - created 5F branch, 1 1/2 miles.

4) #7 Smith- extended 7A, 1 1/4 miles.
- created 7D branch, 1 1/4 miles.
5) #8 South St. Paul - extended to Inver Grove Heights, 3.5 miles.
6) #10 St. Clair - created 10B branch, one mile.
7) #12 Roseville - created 12C branch, 2 1/2 miles.
- created 12D branch, 1 1/2 mile.
8) #22 Hi-rises - created entire line, five miles.
9) QT Loop - created two lines, 2 1/2 miles.

Of these new services, most have continued the old pattern of CBD-orientation. There have been some exceptions, however, and they are interesting enough to warrant detailed descriptions. They are indicative of both MTC's better efforts, and MTC's failings.

#11 Lowry is MTC's resurrection of a route abandoned over a decade ago when the Lowry Avenue bridge was closed for rebuilding. It is primarily a conventional city crosstown, but its end termini reach into the suburbs. The east end reaches the long-bypassed St. Anthony Shopping Center. Unfortunately, the half mile of suburban running is saddled with a ten-cent extra fare.

#5F is an extension of the old North Hennepin Transit Bass Lake Road route. Instead of running it to downtown through Crystal and New Hope as before, it has been extended east to Brookdale to form a sort of mini-crosstown between the Highway 52 and Brooklyn Boulevard corridors. This good move was spoiled by one of the most infrequent and obscurely-motivated schedules on the entire system. The frequency has since been increased to a more realistic level, but the only late evening departure from Brookdale is still 45 minutes too late for either shoppers or Brookdale employees.

#14M is an extension of an old branch that for years languished a mile short of Brookdale. Now it reaches the center, an example to be followed by other lines. The route has one other interesting feature. It has been routed the long way through Robbinsdale thus expanding the

Brookdale access area. This is the first time extra route coverage has been added primarily to feed a suburban center.

For years the #4 Johnson ended at 37th and Stinson NE, about five blocks short of Apache Plaza. MTC has since extended one out of every three buses into the center via a new branch, #4B. More significant, however, is the fact that MTC extended the fare zone as well, so that 4B riders are not penalized the extra 10¢ for such a short distance beyond the city limits. That is the first such instance of a zone extension to encompass a nearby suburban center. Similar measures could and should be applied to Brookdale, Southdale, The Hub, and Signal Hills Center.

Even with these improvements, the MTC manifests a reluctance to decisively eliminate outmoded practices. An additional one-third of the #4 buses serve the east side of Apache on their way to New Brighton. The separate route allows them to serve 37th Avenue from Stinson to Silver Lake Road. However, passengers who ride the 4D to Apache must pay the extra dime; and the final third of the buses never reach Apache at all, but continue to stop at the old 37th and Stinson cutback.

As soon as Northtown Center opened (with only a portion of its stores ready to conduct business), MTC extended #10 Central and instituted hourly base service, plus rush hour extras. The service day runs from 6:30 a.m. to 9:45 p.m. This is the first time that MTC has initiated such a complete service to a new suburban center with such promptness. The old terminus at Mississippi Street was eliminated as a cutback, another good decision. The shortcoming is that the Rosedale-Har-Mar complex, which is older, stronger, and closer in than Northtown, still has only rush hour access.

Signal Hills Center in West St. Paul is the first suburban center to receive complete access in all directions. This was done in one stroke and MTC is to be commended for it. Formerly, only #8 Robert passed the center on its way to South St. Paul. #8 was extended into Inver Grove Heights, the current fringe of residential growth. #5 Stryker and #7 Smith were both routed through the center, and extended into new neighborhoods on the residential fringe. The resultant route of the #7D is particularly striking. Now it describes three sides of a square on its way to the center, certainly unlike the CBD-oriented stub that it was for many years.

2. Express Service

Better publicized than its local services have been MTC's new express routes. In no other area has MTC made such a spirited attempt to attract new riders from among the more affluent, auto-oriented suburbanites. Two types of expresses have been used in the past and continue today; they are street expresses and freeway expresses. Both pick up on local streets and let off passengers at their termini and important intermediate transfer points. The difference between the two types is the difference between a street and a freeway. The freeway express can cover a great deal more ground in a given period of time than a street express. This contrast is furthered by the additional stops which a street express makes in its zone. As a rule, passengers who board in the inbound express' local service zone may debark at any point in the express zone, with the process reversed on the outbound trip. A freeway express does not have this capability (some might call it a liability), because of the limited number of intermediate points it is physically able to stop at.

With these distinctions made, let us inventory to the best of our knowledge those expresses that existed before MTC and those that currently run. The following are not necessarily listed in the order in which they began service.

Pre-MTC (in existence today):

Bloomington Bus Company:

1) Express A: Minneapolis - Masonic Home (112th and Normandale).
2) Express B: Minneapolis - 110th and Thomas.
   Expresses A and B are the only freeway expresses in the Metropolitan area that make any kind of extensive use of diamond interchanges as intermediate stops during the express portion of the trip. They stop on I35W at 90th, 82nd and 66th Streets as well as the Lake Street on-freeway station.
3) Express C: Minneapolis - 106th and Lyndale.
4) Express D: Minneapolis - 90th & Dupont.
5) Lyndale Avenue; Minneapolis-Masonic Home. This is the only street express in the Metropolitan area that is designed exclusively for reverse commuting.
6) Main Line - This is the only off-peak freeway express in the Metropolitan area; Minneapolis-Masonic Home.

General note: Despite their use of rather uncomfortable equipment (modified school buses), this company has shown more ingenuity and boldness than any other suburban operator, as well as MTC in several cases. Besides the three firsts listed above, it was the first mini-bus operator in the area, and the first private operator to attempt a suburban crosstown, or to honor transfers between its own buses. Also the timetable has uniform off-peak headways.

Richfield Bus Company:

1) Minneapolis-Chanhassen via Lake Street and Minnetonka Boulevard.
2) Minneapolis-Chanhassen via Lake Street and Highway 7.
3) Minneapolis-Chanhassen via Highways 12, 100 and Minnetonka Boulevard.

Medicine Lake Lines:

Note: Medicine Lake Lines has about six basic routes, or could have if it utilized them properly. As it stands, there are something on the order of 20-25 routes. Of the further-out trips, almost no two are alike. To call their timetable complicated is to understate considerably - it is unreadable. We are certain that their ridership will increase noticeably when their schedule is rendered coherent.

To generalize, there are street expresses on Olson Highway from Minneapolis to Golden Valley, Crystal, New Hope and Plymouth. Some run a longer express zone than the others, but the timetables give no indication of this longer zone's exact perimeters.

Dickenson Lines:

Note: With MTC's takeover, all the routes described here have been incorporated into existing MTC routes.

1) East River Road: Minneapolis-Anoka.
2) West River Road: Minneapolis-Anoka RH only.
3) Spring Lake Park: Minneapolis-Coon Rapids-Anoka.

Rice-Edgerton Lines:

1) St. Paul-Circle Pines via Rice.
2) St. Paul- Circle Pines via Dale & Rice.
3) St. Paul-Circle Pines via Dale, Rice & Edgerton.

St. Paul South & West Transit:

1) Dodd Road: St. Paul-Mendota Heights.
2) South St. Paul: St. Paul-South St. Paul.
3) St. Paul Park: St. Paul-St. Paul Park.

MTC

1) #15A White Bear: St. Paul-Bald Eagle via White Bear Avenue and McKnight.
2) #15B White Bear: St. Paul-White Bear via Highway 61.
3) #15C White Bear: St. Paul-Bald Eagle via Highway 61, and White Bear Avenue.
4) #15D Mahtomedi: St. Paul-Mahtomedi via Highway 61 or White Bear Avenue. Note: 15D is the only MTC schedule that rivals Medicine Lake Lines for confusion. There is even a connecting shuttle bus (the only one in the suburbs) involved in some of the trips.
5) #12A Hopkins: Minneapolis-Hopkins via Excelsior Boulevard.
6) #12B Hopkins: Minneapolis-Hopkins via Excelsior Boulevard and Elmo Park Loop.
7) #12D Glen Lake: Minneapolis-Glen Lake Sanitarium via Excelsior Boulevard. Note: All 12's run express to Lake Street. This makes them the only off-peak expresses run by MTC. #12D also makes one round trip with an extended express zone to Woodale Avenue (Highway 100).
8) #12F Hopkins: via Highway 7. Note: During the pre-freeway era, this was as close as Twin City Lines got to a high-speed express service.
9) #16A Minneapolis-St. Paul: via University Avenue. Note: This is the only street express in the Twin Cities without a non-CBD local zone. Outside the CBD's, it is a pure limited stop service, pausing every half mile or so along the route.
10) #18 Nicollet: Minneapolis-104th and Nicollet.
11) #21 Selby-Lake: St. Paul-Lake and Hennepin.
12) #21 Selby-Lake: 36th and Lake and Wayzata Boulevard. Note: This is a special service to Gamble Company headquarters. It was

Twin City Lines' only freeway express.

13) #5E Chicago; Minneapolis-98th and Portland.
14) #5H Chicago; Minneapolis-86th and Bloomington.
15) #4E Bryant; Minneapolis-Southtown.
16) #5 Fremont; Minneapolis-Brooklyn Center.
17) #6D France; Minneapolis-Southdale.
18) #6J Xerxes; Minneapolis-Southdale.
19) #10E Central; Minneapolis-66th and University.
20) #17C St. Louis Park: Minneapolis-Knollwood Plaza.
21) #8C Robert: St. Paul-South St. Paul.
22) #12D&K Stillwater: St. Paul-Stillwater.

Pre-MTC private operator expresses:

Zephyr Lines:

23) Mound South Shore: Minneapolis-Mound via Highway 5.
24) Mound North Shore: Minneapolis-Mound via Long Lake.
Note: This service is now MTC #51.

North Hennepin Transit.

Note: We are not sure of the exact routes North Hennepin ran. These have since been divided between MTC #14 and #19 and run today as follows:

25) #14 Robbinsdale: Minneapolis-67th & Douglas.
26) #14G Robbinsdale: Minneapolis-67th & Winnetka.
27) #19B Noble: Minneapolis-42nd and Douglas.
28) #19D St. Croix: Minneapolis-42nd and Douglas.

MTC has moved strongly to implement more expresses. Even before taking over Twin City Lines, MTC created and subsidized three Twin City Line expresses:

#1 Har-Mar: Har-Mar Center-St. Paul via I94 and Snelling.
#50 Minneapolis-Airport. Note: This is the most multi-purpose express ever run by MTC. It feeds the GSA Building in Fort Snelling, the Airport, the Control Data complex on I494, the Metropolitan Stadium Park and Ride; it runs today as #35P.

#50 St. Paul Airport: St. Paul-Metropolitan Stadium. Note: These services originally ran all day long, the only off-peak freeway expresses ever run by MTC. This proved to be an over-extension. MTC originally hoped to attract air travelers, but was unable to meet the existing competition, taxis and limousines. The failure was probably unavoidable, given the characteristics of the service. There were no facilities for handling luggage, and the service was not door-to-door, a requirement of traveling businessmen who make up most of this travel market. The dollar difference in fare was not enough to make a difference to expense account travelers. Consequently, the service was pared down to rush hour only. The St. Paul

route no longer serves the airport, but survives as a conventional commuter express from the Met Stadium Park and Ride.

Since MTC bought Twin City Lines, a systematic growth of expresses has taken place. Basically, these have sought to fill in those gaps in CBD-oriented service where no expresses previously existed. The following have been added with this goal in mind:

#4 Johnson: Minneapolis-New Brighton.
#5J Brooklyn Park Redball: Minneapolis-80th and North Zane.
#10F Northtown via University.
#12E Clear Springs: Minneapolis-Highway 7 and Excelsior Boulevard.
#14J Robbinsdale: Minneapolis-58th and North Orchard.
#17E St. Louis Park: Minneapolis-Hopkins.
#35B North St. Paul-White Bear: St. Paul-White Bear.
#18D Nicollet: Minneapolis-104th and Nicollet.
#8G Lyndale: Minneapolis-Brooklyn Center.
#29 Blaine Manor: Minneapolis-Blaine.
#25 Mounds View: Minneapolis-Mounds View.
#6 Southdale Redball: Minnepolis-Southdale.
#5 Portland Redball: Minneapolis-105th and Portland.
#35N Burnsville Redball: Minneapolis-Burnsville.

While most other expresses existed in the timetables with little fanfare, this changed with the arrival of the Redball idea. Each of the Redballs received good media publicity plus a mail-out campaign using attractive brochures and in some cases offering a free introductory ride. It was the best publicity to date ever given a bus service in the Twin Cities. The new routes, largely as a result of this, quickly filled up and additional runs were added to their schedules.

Meanwhile, one largely overlooked service was quietly setting load-carrying records for expresses. #18D Nicollet originally ran only street expresses from 104th and Nicollet. With the MTC takeover, some runs were diverted onto I35W at 60th Street for the run downtown. Patronage rose and more such runs were added until every trip on that portion of the line was an express. Headway dropped to five minutes, the lowest express headway ever, and the lowest suburban headway ever.

The success of the Redballs preceded MTC's largest effort to date,

the I-35W Corridor Project. The project, the first of its sort in the nation, is receiving much federal help; it is an experiment in freeway metering. The basic concept is to halt the on-flow of autos whenever electronic sensors warn the computer of impending overloads and consequent slowdowns in traffic speed. Short traffic signals (meters) installed on the entrance ramps will give a red light to autos whenever this occurs. Meanwhile, buses will have unrestricted access via their own exclusive ramps.

The bus ramps and metering system are currently under construction and are scheduled for implementation in Fall 1973. The bus routes were inaugerated in advance in December 1972. There are 14 routes in all. Five of them were previously in service and have been renumbered to conform to the new routes. The new routes include:

35A to 46th and Lyndale.
35B to 50th and Xerxes.
35C to 60th and Xerxes.
35D to 52nd and Cedar.
35E to 78th and Chicago.
35F to 79th and Xerxes.
35G to 104th and Portland (formerly Portland Redball).
35H to Tracy and Benton (Edina).
35J to 69th and Antrim (Edina).
35K to Southdale (formerly Southdale Redball).
35L to 104th and Nicollet (formerly #18D Nicollet).
35M to 142nd and Cedar.
35N to Burnsville (formerly Burnsville Redball).
35P to Airport, Met Stadium (formerly #50 Airport Express).

In all, there are 65 rush hour trips on I-35W since the implementation of the new routes. In addition, 20 trips on ten of the 14 routes serve reverse commuters. This is not the first such application of reverse commuting, but it is by far the largest.

The I-35W buses deserve extra commentary because of their unprecedented scope:

1) They serve almost every possible neighborhood in the freeway corridor. The only other possible routes that might be implemented are:

a) The current route of #5H Chicago along Bloomington and 12th Avenue to about 98th Street. The next best alternative is currently in existence. There are street expreses on this route, and all #5H's make good transfer connections with #35P at 60th and Portland; b) The neighborhood east of Lake Nokomis and south of Minnehaha Creek; c) Mendota Heights across the Nokomis Bridge. There is considerable potential here for reverse commuting from the rapid industrial growth in recent years; d) Burnsville along Cedar Avenue.

2) On the routes with more than three trips, headways are uniform, at 5, 15, 20 or 30 minutes. This is a plus, as the chapter on Schedules has pointed out.

3) Church parking lots are being used as Park-and-ride sites. This is MTC's first such application of the idea. It conforms with our general thesis of maximizing use of existing facilities to minimize costs.

4) Some important transfers were poorly planned or not planned at all. These include: a) from #7 Minnehaha or #9 West 7th Street to #35P at the Fort Snelling GSA Building. Employment trips to the airport and Metro Office Park area are currently subject to long transfer waits. The #9 connections as a rule are missed by only minutes; b) from #35H and 35K to #6E&K at Southdale. The Pentagon Park-Radisson South area is a prime market for reverse commuting trips. MTC has acknowledged this fact by extending a fairly frequent rush hour service there. However, no attempt has been made to connect this with the freeway expresses. Making the necessary changes would not be difficult. All that would be necessary is to extend a different combination of existing #6 France-Xerxes buses than is currently used.

5) In the earlier section on speed, we noted several locations

of streets with no stop sign protection that are used as bus routes. Two of those streets, East 52nd Street and West 56th Street, are among those traveled by I-35W expresses. We repeat that MTC perpetuates an unsafe situation by not petitioning the city for proper posting of signs.

Should the I-35W buses prove successful, Redball service will doubtless be extended into those corridors currently without CBD-oriented expresses. In their Transit Development Report, MTC states that about 100 miles of rush-hour expresses will continue to be added each year for the next several years. We predict service potential along the following routes:

From Minneapolis:

1) to Rosedale and Roseville along Highway 36.
2) to New Brighton and St. Anthony via Highway 8.
3) to the Bass Lake Road and Winnetka area via Highway 52.
4) to downtown St. Paul via I-94 and the University of Minnesota.
5) Street expresses for the furthest portions of #19 - 28th Avenue South - and #22 - 34th Avenue South, both via Hiawatha Avenue.
6) to western Edina along Vernon Avenue and Interlachen Boulevard via Highway 100 and 12.
7) to New Brighton and adjacent suburbs along Silver Lake Road and Long Lake Road north of I-694.

From St. Paul:

1) to University of Minnesota via I-94 (see above).
2) to Cottage Grove and Hastings via Highway 61 (already proposed by MTC).
3) to Inver Grove Heights via Highway 56.
4) to 3M Complex and Stillwater via I-94.
5) to Lake Street in Minneapolis via I-94 (already proposed by MTC).
6) to unspecified points in Roseville via I-35W and Highway 36.

As more and more CBD spokes receive expresses, pressure will mount for service to non-CBD centers. In some cases this will take the form of reverse commuting on the CBD expresses. Increasingly, though, separate services will have to be implemented or MTC will find itself faced by irate suburban taxpayers.

The paragraph above does not mean such service is currently non-

existent. Several references to other services have already been made in this text. Expresses to non-CBD activity centers currently include the following:

Bloomington Bus Company:

1) Minneapolis-Masonic Home. Street, via Lyndale Avenue. Serves 66th and Lyndale shopping center, I-494, Oxboro Center, and Valley West Center.

Medicine Lake Lines:

As before, recounting individual routes will be too much detail. Suffice it to say that the following centers receive street express service from Minneapolis via Olson Highway:

1) Highway 100-Highway 55 industrial park, Golden Valley Lutheran College.
2) Golden Valley Shopping Center.
3) Midland Shopping Center.
4) Plymouth Shopping Center.
5) Minneapolis Industrial Park.

Rice-Edgerton Lines:

1) St. Paul-Circle Pines via Rice Street serving no centers.

St. Paul South and West Transit:

1) St. Paul-Mendota Heights via Dodd Road serving no centers.
2) St. Paul-South St. Paul, serving no centers.
3) St. Paul-St. Paul Park, serving North Star Steel Company.

MTC

1) #1 Har-Mar, serving Har-Mar, Falcon Heights Center, Midway Center from St. Paul; serving Falcon Heights Center, Midway Center from Har-Mar.
2) #12 Hopkins, Minneapolis-Hopkins via Excelsior Boulevard, serving Miracle Mile Center, Methodist Hospital, Hopkins industrial-commercial area.
3) #12 Hopkins via Highway 7, serving Knollwood Plaza, Hopkins.
4) #15C White Bear. St. Paul-White Bear via Highway 61, serving commercial-industrial areas at Highways 61 and 36, Highways 61 and 244, and White Bear.
5) #21 Lake Street, 36th and Lake to Gamble Center via Lake and Highway 100, serves Turner's Crossroad industrial area.
6) #51 Mound via Highway 12, serving Turner's Crossroad area, General Mills headquarters, downtown Wayzata, and Tonka Toys factory.

Note: 7-13 are expresses to the University of Minnesota's Minneapolis campus. They also serve the complex formed by Fairview Hospital, St. Mary's Hospital, and Augsburg College. The expresses

were originally planned and subsidized by the University, which agreed to handle all financial obligations over an experimental two-year period, at the end of which MTC would take over the routes. There was a certain amount of experimentation carried out, some of which did not bear fruit. Attempts to serve North Minneapolis were twice unsuccessful. The first attempt terminated at Xerxes and Golden Valley Road; the second run by Dickenson Lines, began at Anoka and traversed Osseo, Brooklyn Center, North Minneapolis, and downtown before reaching the University, a highly unattractive 90 minutes later.

7) #52B to Southdale via city streets. Note: terminal-to-terminal time on this route is currently 60 minutes. By using I-35 expresses and transferring downtown to #16, 5-15 minutes may be saved. This leads us to believe that the route will not endure long in its present form. Should ridership grow large enough, we recommend it be divided into two parts where it crosses I-35W.
8) #52C to 42nd and Lyndale via I-94 and Lake and Hennepin.
9) #52D to 76th and Penn via I-35W.
10) #52E to downtown St. Paul via I-94.
11) #52F to Edgecumbe and Snelling via I-94.
12) #52G to 83rd and Lyndale via I-35W. Note: this service is run by Bloomington Bus Company, but free transfers are allowed to MTC connecting lines.
13) #52J to 44th and Central.

Note: The following are the same I-35W corridor buses mentioned earlier, but only those with facilities for reverse commuting are listed here:

14) #35A to 46th and Lyndale, serving no centers.
15) #35B to 50th and Xerxes, serving no centers.
16) #35C to 60th and Xerxes, serving Diamond Lake and Nicollet, 54th and Lyndale small commercial areas.
17) #35D to 52nd and Cedar, serving 48th and Chicago small commercial area.
18) #35E to 78th and Portland, serving I-494 commercial area.
19) #35F to 79th and Xerxes, serving 66th and Penn commercial area, North West Finance Center.
20) #35G to 104th and Portland, serving I-494 commercial area, 98th and Portland commercial area.
21) #35H to Benton and Tracy (Edina), serving Southdale.
22) #35K to Southdale.
23) #35P to Airport, serving Ft. Snelling, G.S.A. Building, Airport, Post Road, Metro Office Park.

24) #3M White Bear-3M Complex via I-694 and I-94. This is the only fulfledged, suburb-to-suburban center Freeway express. The only other contender for that title, #21 Gamble Center, runs a short distance on the freeway more by necessity than choice. In the case of #3M, a definite choice was involved.

As the above list clearly shows, the vast majority of these routes merely carry passengers on their way to their bread-and-butter CBD-ori-

ented destinations. They did not come into existence primarily to serve suburban centers.

The real frontier with the highest risks for transit is the cross-suburban market. This is also where the ultimate success of transit will be decided. This is not to downgrade MTC's efforts in the central cities; we merely point out that the city provides a climate much more conducive to transit development. Trip ends are more concentrated, population densities are higher, parking is more difficult to find, and access roads are more crowded. A far larger percentage of the population is restricted to using transit for reasons of age, income, or physical disability. The suburbs' extreme unwillingness to accomodate these people has contributed much to their concentration in the cities. The long term presence of transit has had a formative effect on the life style of city residents.

Almost none of these salutary characteristics are present in the suburbs. More suburban families own two cars than one, parking is seldom a problem, freeways are more available, and trip destinations are more dispersed. Only three factors weigh in favor of transit.

a) Suburban residents are discovering that low densities in a large urban area are disappearing. There may be low density residential areas, but commercial and industrial establishments sooner or later cluster, usually because of zoning ordinances designed to keep these places out of the neighborhoods. What soon becomes evident is that a full-sized CBD is not necessary to produce a full-sized traffic jam. A large shopping center or industrial park will produce the same effect. This was simply not ackowledged before, when the freeway was everybody's answer to traffic congestion, but now it is becoming obvious to a great many suburbanites that the auto is not a very efficient mover of large

numbers of people.

b) The 1970 U.S. Census says there are more two-car suburban families in the Twin Cities than one-car families. This majority did not exist in 1960, except in high income communities, such as Edina and Minnetonka. Now, however, a great many more households having lower income have assumed this cost, which has been estimated to average around $800 per year. This figure applies to second cars only, but the same source shows that roughly 250,000 such cars currently exist in the Metropolitan area and therefore amounts to a total expenditure of $175 million per year for second cars alone. It goes without saying that auto costs will increase continuously in forthcoming years. Any type of communal vehicle that is well patronized will cost less than that. This is what transit has to offer, and the suburban multi-car owner is beginning to realize this.

c) The internal combustion engine burnes fuel inefficiently. It is the single greatest source of air pollution in the Twin Cities. The automobile requires large, expensive roadways that take huge tolls in environmental damage and taxable land. We are now beginning to appreciate that auto fuel may become highly expensive or even scarce in upcoming years. In addition, the auto is the most dangerous mode of land transport. All these reasons are being taken more seriously now than ever in the past. When public sentiment reaches the point that something is finally done, the people who will do it are the suburbanites. They will take action because they have greater numbers and greater affluence than any other affected group in either the Metropolitan area or the nation. Presumably, they will also have more to lose.

3. Suburban Centers.

Having identified the suburbs as the greatest challenge for

transit, the question still remains, "How can such diverse trip origins and destinations be served?" The answer is that not all of them can be served. What can be served are the commercial and employment centers where trips concentrate. The route grid which serves them will be able to coincidentally handle some of the more dispersed trips.

The definition of a servable center is necessarily loose. This report does not purport to state where the minimum size figure should be placed, but it assumes that this threshold is lower when centers distribute themselves in such a way that several may use the same transit routes. This has happened repeatedly in the Twin Cities, e.g., Rosedale, Har-Mar, and three distinct industrial areas sit shoulder to shoulder in a four-mile long arc. Dispersed centers are evident along Highway 100 through the west Minneapolis suburbs. I-494 has spawned a nearly continuous strip of development from Highway 100 east to the Airport. A second line of industries has located along County 18 and Highway 55 from Plymouth Village through Golden Valley to Hopkins.

As noted previously, one need only provide access within a six-mile radius to serve the majority of work trips to these centers, and within a four-mile radius to serve most shopping trips. It was also pointed out that trips with one transfer can adequately serve these distances within the time limitation of 30 minutes, although it is impractical to provide suburban centers with the kind of transfer-free access currently provided to the two CBD's or even to the University of Minnesota. While the suburbs collectively are passing the CBD's in total trip generation, there is no single suburban trip concentration which equals either of the CBD's.

One may still be optimistic as to the role of transit by looking at the route coverage that currently exists. Most built-up parts of the

Metropolitan area are within walking distance of a bus. These buses pass suburban centers on their way downtown, but fail to converge on them. By laying a feeder route across the existing network of parallel routes, it is possible to gain access to this existing network. That addition, and the in-filling of remaining gaps in route coverage is basically what this report is recommending.

To illustrate this, we will take six of the more prominent centers and restructure as well as expand bus service to create complete access. (Note: See maps that accompany each center. Also, all route modifications and headway changes alluded to below are listed in complete detail in the Master Route Guide section of this report.)

Rosedale-Har-Mar:

Existing service:

MTC #1 Har-Mar Redball - Rush Hour only access from St. Paul.
MTC #4 Snelling-#12 Roseville combined service; Rush Hour plus limited Off-peak access from St. Paul.

Future improvements:

1) Extend North Minneapolis crosstowns (#3 and #11) into center; Rush Hour only.
2) Modify #4 Snelling and #12 Roseville to enter center independently and serve more of Roseville and Falcon Heights; provide regular headway all day.
3) Extend #8 Jackson across Roseville to Center.
4) If Rice-Edgerton Lines are purchased, modify routes to extend across Roseville to Center.
5) Create section of freeway express serving center via Highway 36, I-35W and I-694.
6) Create Larpenter Avenue crosstown extending into Minneapolis.

Brookdale:

Existing service:

MTC #5 to Minneapolis.
MTC #5D and #5E to Brooklyn Boulevard area Northwest of center.
MTC #5F to Crystal and New Hope via Bass Lake Road; Limited access.
MTC #14C and M to Robbinsdale and Minneapolis.
MTC #8F via 57th Avenue to River; Sat. to Minneapolis.

Future improvements:

1) Extend #5 into unserved neighborhoods in Brooklyn Park.

2) Extend #5H Penn to center.
3) Extend #8 Lyndale to center.
4) Extend #5C to center.
5) Increase frequency on #5F to regular all-day intervals.
6) Create freeway express to center via I-694 and Highway 100.
7) Create local service to Columbia Heights and Apache Plaza via I-694 bridge.

Southdale:

Existing service:

MTC #6 Xerxes-France to Minneapolis.
MTC #15 66th Street to Richfield.
MTC #35H and J - Rush Hour only from western Edina.
MTC #35H and K - Rush Hour only from Minneapolis.
MTC #6 E and K from Radisson South - Rush Hour only.
Bloomington Bus Company crosstown minibus to Bloomington.

Future improvements:

1) Extend #15 66th Street into Lake Nokomis neighborhood.
2) Extend #15 north into Minneapolis as OP freeway express.
3) Extend #15 west along routes of #35J and H.
4) Create new crosstown via Woodale, Miracle Mile, Texas, and Winnetka Avenue to Golden Valley Center.
5) Extend #10 Grand to center.
6) Create freeway express to center via Highway 100.
7) Extend #4 and #6 connecting services further west into Edina.
8) Consider Dial-a-Ride in neighborhoods directly west from Center.

Signal Hills:

Existing service:

MTC #5, 7 and 8 to downtown St. Paul.
MTC #5 south into West St. Paul.
MTC #8 to South St. Paul and Inver Grove Heights.
Connection via St. Paul South and West Transit Company into Mendota Heights and South St. Paul.

Future improvements:

1) Arrange free transfer to St. Paul South and West Transit Company.
2) Possibly create freeway express via I-494 and Highway 100.

Airport-Ft. Snelling-Metro Office Park:

Existing service:

#35P freeway express, RH only, to Minnepolis.
Connections to Minneapolis via #5 Chicago and #7 Minnehaha.
Connection to St. Paul via #9 West 7th Street.

# KEY FOR 30-MINUTE SUBURBAN CENTER ACCESS MAPS

Existing 30 minute access by:

Local bus service

Express bus service

Proposed 30 minute access by:

Local bus service

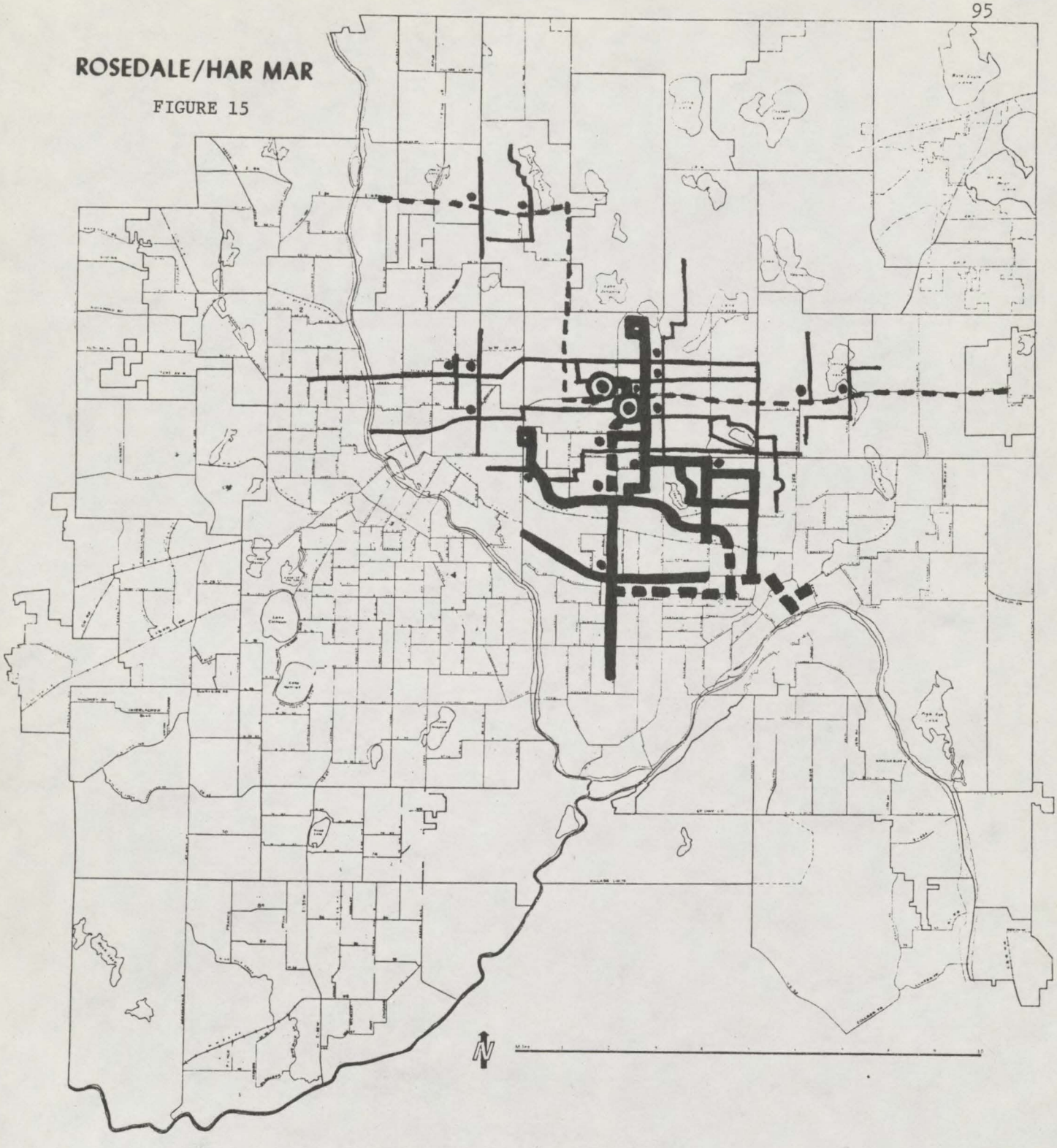
Express bus service

Transfer points

Suburban center

# ROSEDALE/HAR MAR

FIGURE 15

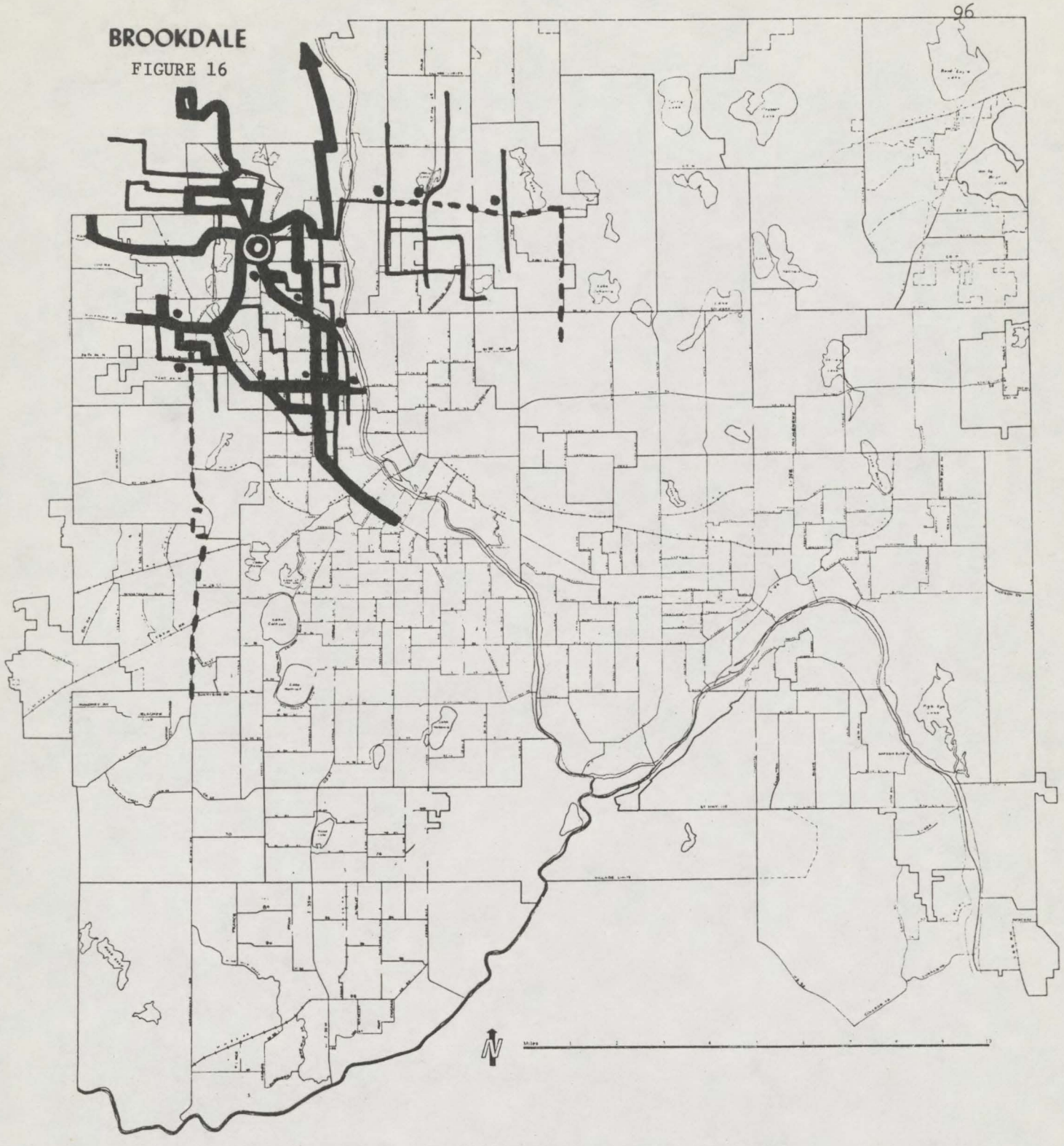


**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

**BROOKDALE**

FIGURE 16

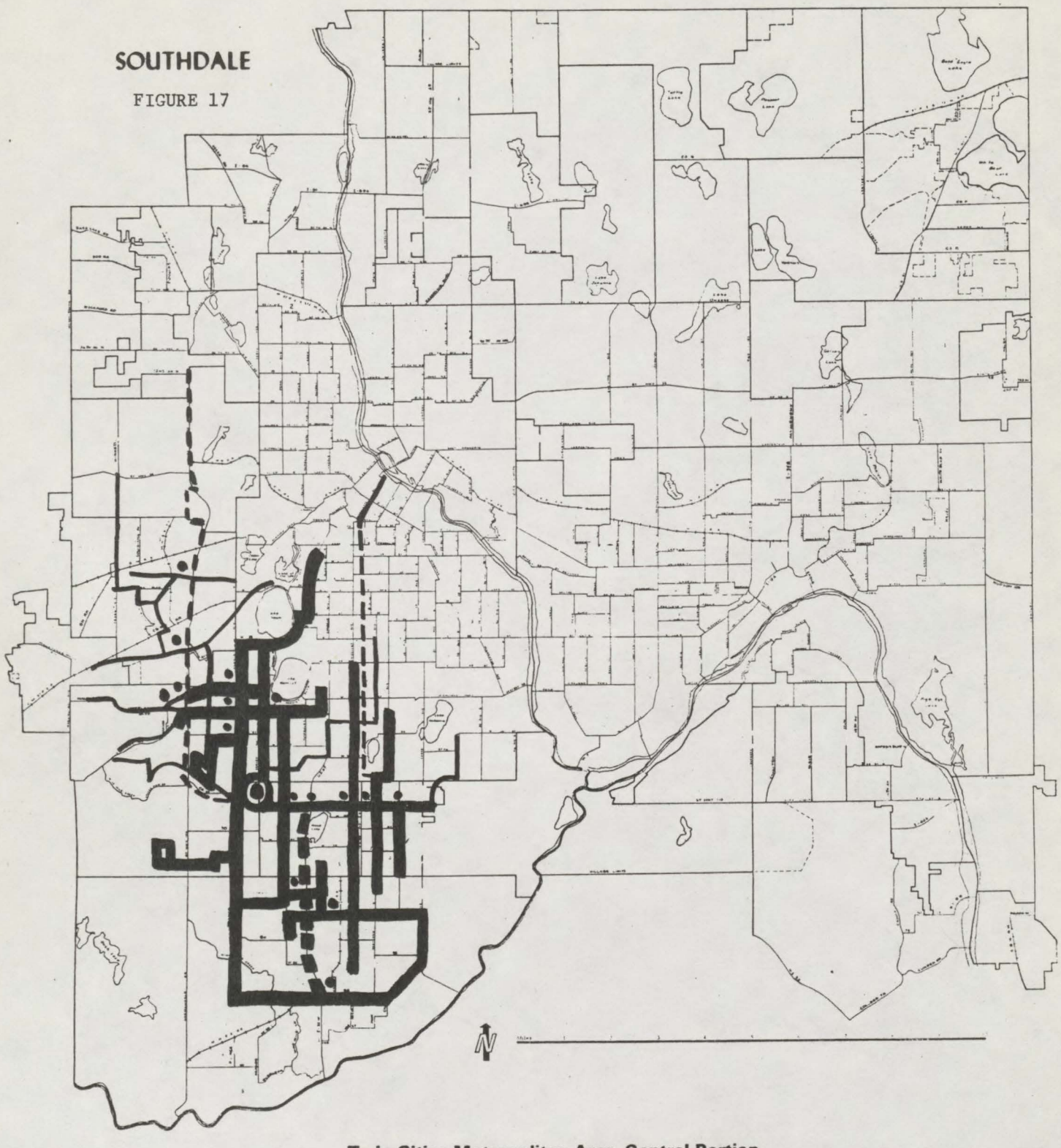


**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

**SOUTHDALE**

FIGURE 17

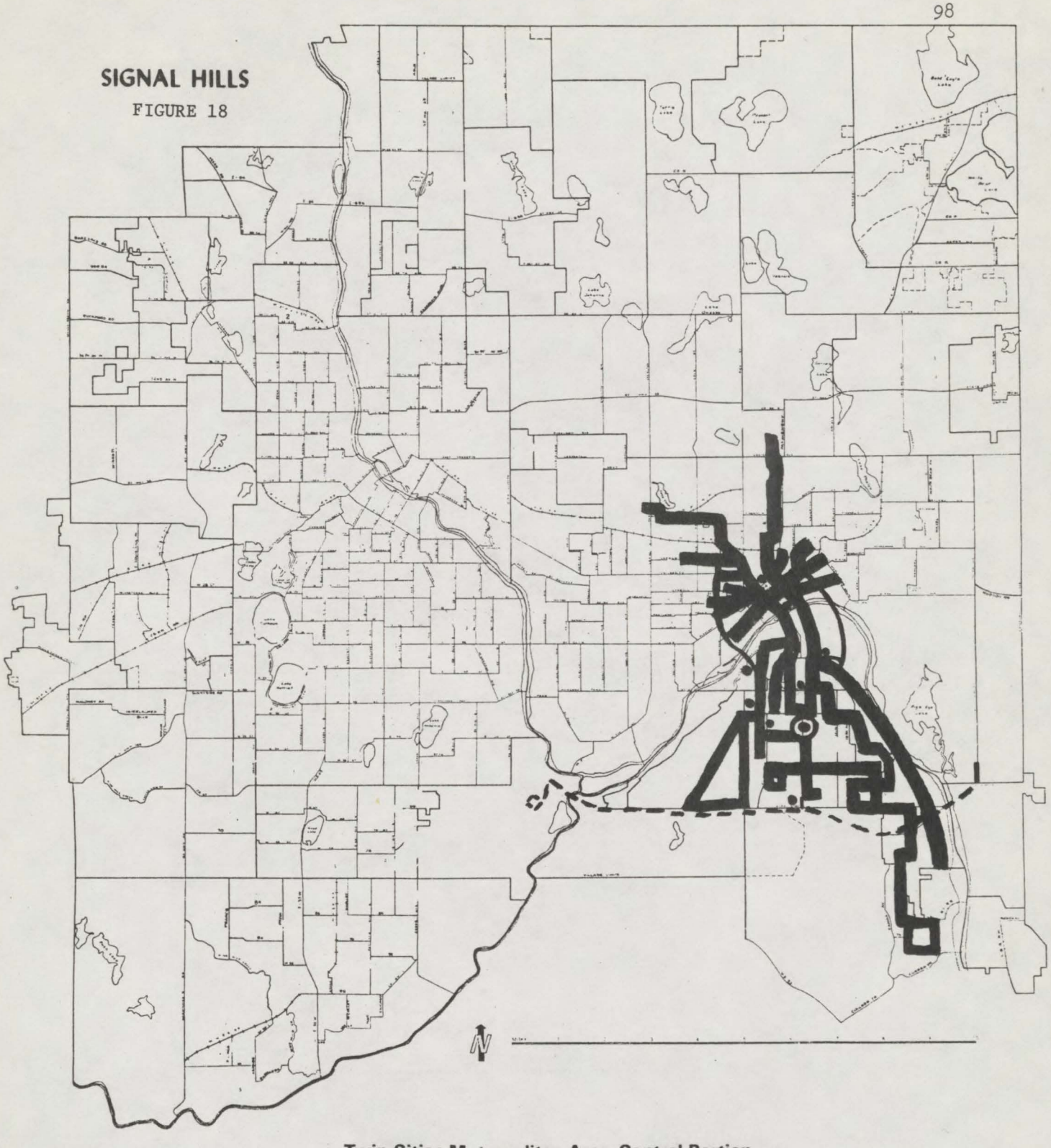


**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

**SIGNAL HILLS**

FIGURE 18

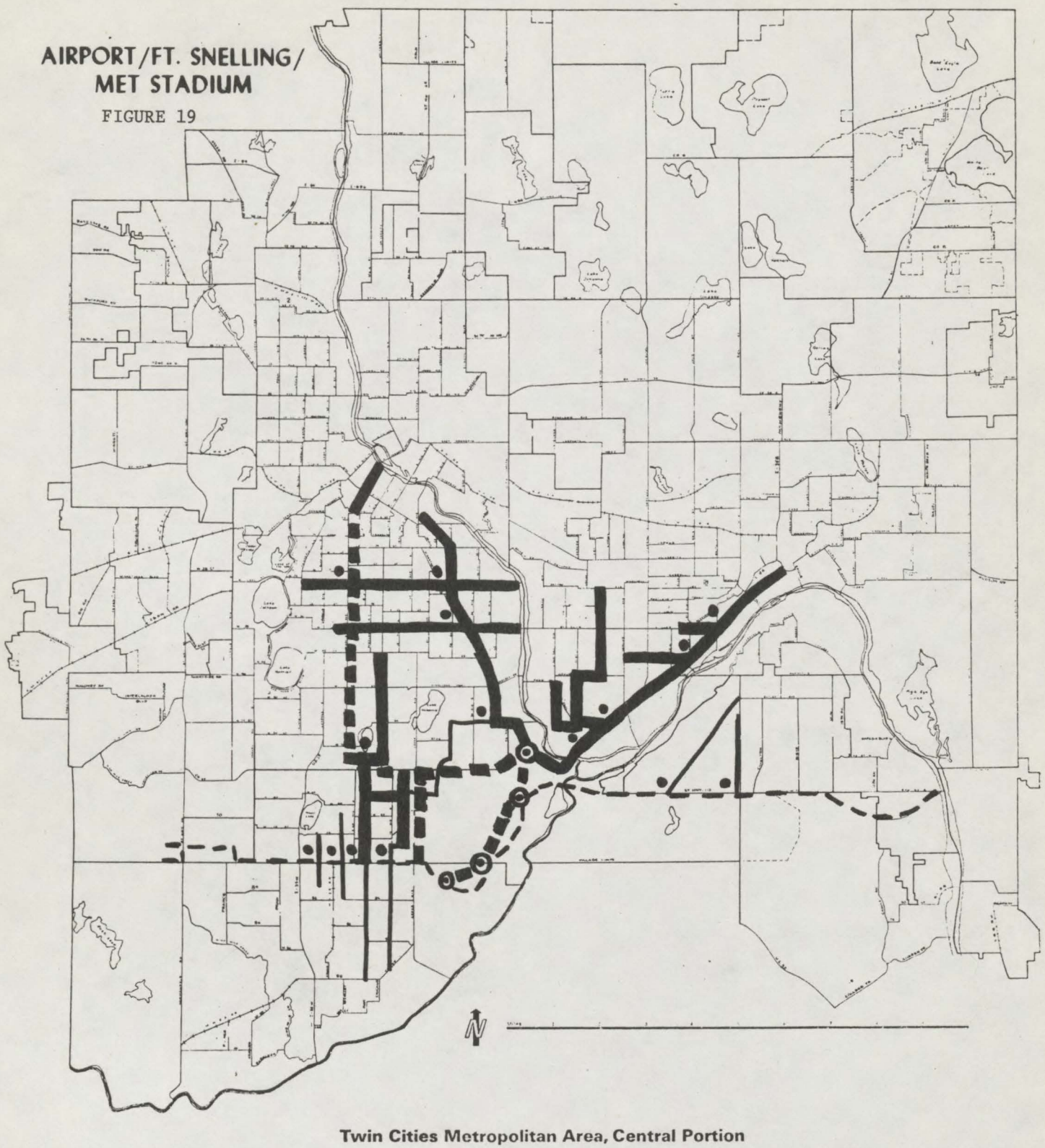


**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

# AIRPORT/FT. SNELLING/ MET STADIUM

FIGURE 19

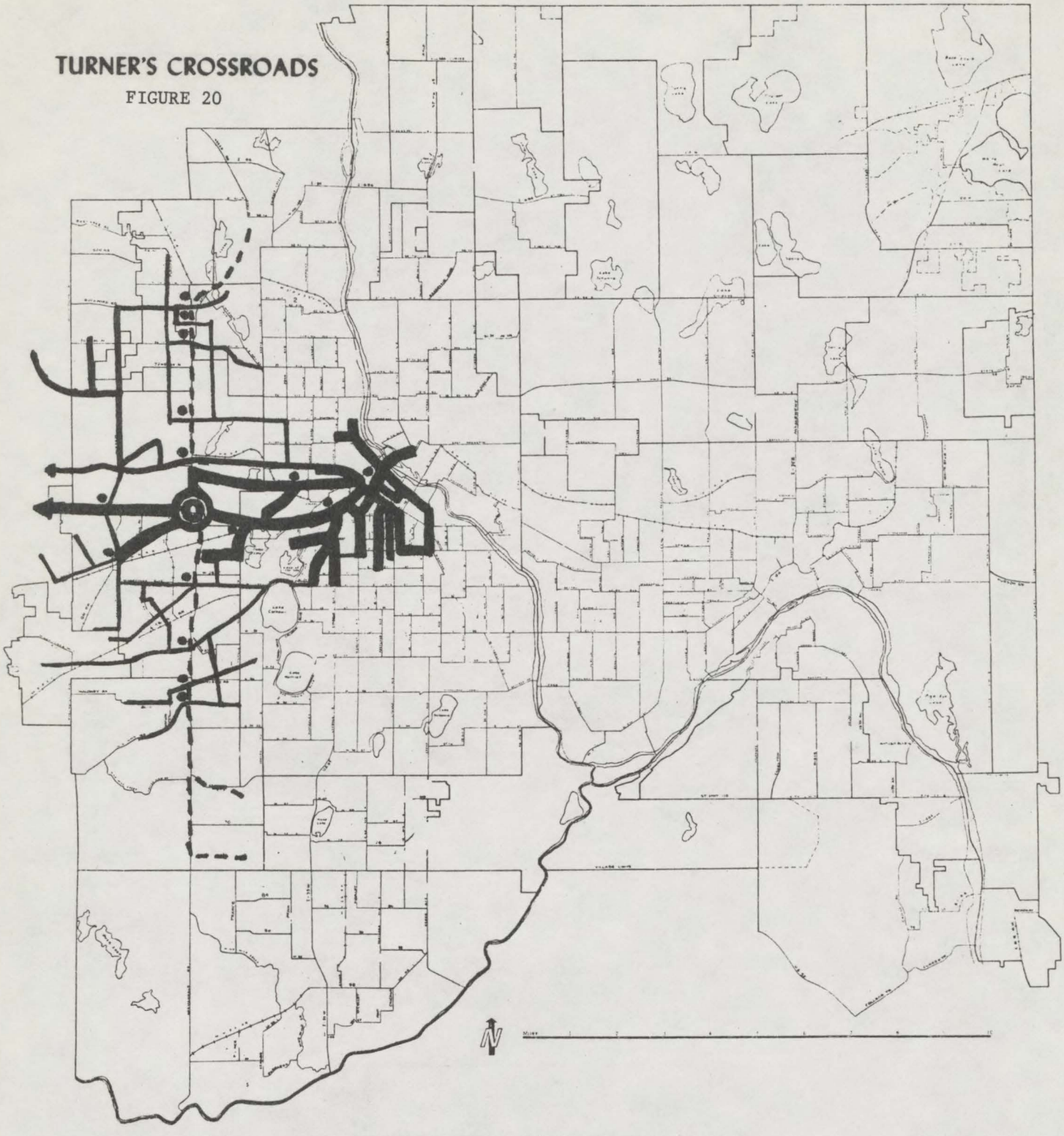


**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

## TURNER'S CROSSROADS

FIGURE 20



**Twin Cities Metropolitan Area, Central Portion**

Political Boundary as Tract Boundary
Railroad as Tract Boundary
Other Tract Boundary
Other Political Boundary

Future improvements:

1) Create freeway express via I-494, Mendota Bridge, and Highway 110.

Turner's Crossroad (Highways 12 and 100):

Existing service:

MTC #9 Glenwood and #51 Mound to downtown Minneapolis.
MTC #9 out Cedar Lake Road.
MTC #51 out Highway 12 to Wayzata and Mound.

Future improvements:

1) Create freeway express via Highway 100.
2) Arrange free transfer to Medicine Lake Lines and Richfield. Bus Company.
3) Increase frequency of #51.

The reader will notice references made above to certain expresses and crosstown routes that currently do not exist. These are portrayed in detail in the Master Route Guide section of this report, but a general overview of them is in order here. The following routes are proposed:

1) Metro Outer Ring Express. This is a general title for what may develop as separate links. Only the potentially break-even links would be implemented at first. Ultimately, we perceive a complete ring around the built-up Metropolitan area using the following thoroughfares (beginning arbitrarily at the Airport): I-494, Highway 100, I-694, Highway 36, Highway 120, I-494, Highway 110, Highway 5. To warrant implementation, a link of this route must pass through a substantially built-up area that is already penetrated by local buses, spaced not more than a mile apart on the average. Activity centers should exist along the route at fairly frequent intervals, probably not exceeding five miles. The first link we envision could be placed in service from Brookdale to the

Airport via Highway 100 and I-494. This link, as with later ones, actually displays route variations by time of day. Before eight a.m. and after four p.m., trips would serve industrial office complexes such as Pentagon Park and Metro Office Park. Midday runs would bypass these in favor of commercial centers such as Miracle Mile, Southdale and Southtown.

2) Local crosstown from Southdale to Golden Valley Center via Wooddale, Miracle Mile Center, Alabama, Minnetonka Boulevard, Texas, and Winnetka Avenue. Whether this service will unnecessarily duplicate the express on Highway 100 is unclear. Perhaps the express will handle peak hour service only, leaving the midday to the crosstown. In any event a cross-access is badly needed on this side of the Metropolitan area, perhaps more so than anywhere else.

3) Local crosstown from Brookdale to Apache Plaza via 57th Avenue North, I-694, and then an unspecified route through Columbia Heights on 49th, 44th, or 40th Avenue. This service might also conflict with an eventual link of the Outer Ring Express. In this case, we believe the local service to be more capable of attracting patronage at the present time and recommend that it be installed first.

4) Local crosstown service from Payne Avenue to the University of Minnesota, St. Paul Campus, via Larpenteur. This would merge with an extension of what is currently #6 Como from its present terminus to the campus. The new route is contingent upon the extension of comprehensive local routes north from St. Paul into Roseville.

Besides a number of minor extensions of existing routes, the

above new services should be sufficient to tie the suburban centers into the rest of the MTC network. Beyond these specific recommendations we forsee several other routes which might be implemented at some date in the future:

1) Freeway express from Pentagon Park to Minneapolis Industrial Park via I-494.
2) Local crosstown service from Hopkins to Medicine Lake area via County 73 or County 18.
3) Local crosstown service somewhere on the east side of St. Paul.

4. Dial-A-Ride and Circulators.

Dial-a-Ride.

There are certain travel conditions that conventional local and limited stop services are not set up to handle:

1) low, but not rural, population density;
2) widely spaced (over .75 miles apart) arterial streets separating tangletown (non-grid) residential streets;
3) short-distance travel patterns around or within an activity center or cohesive community.

The first two situations require a service with broader coverage than the half-mile swath of a conventional fixed-route bus. The vehicle must be able to roam within a certain larger area to pick up or drop off passengers. The concept is called Dial-a-Ride, or various other names, all of which mean, "demand-actuated, flexible-route service".

According to MTC's own report on Dial-a-Ride services around the country, there is no such thing as a standard application of the concept. Variables may include vehicle size, dispatching method, and

service area specifications. These are all outlined in the MTC report, which need not be paraphrased here. This report is enthusiastic about Dial-a-Ride and suggests service areas around suburban centers and within center city areas such as Model Cities. It may also be used to feed fixed routes that bypass inaccessible neighborhoods.

The MTC's Dial-a-Ride report came out in July 1972. Since then no action has been taken to implement any such service. However, according to MTC's recently released Transit Development Report, the first service will begin in 1973, although possibly as a "demonstration project". The site was not specified, only that it be "appropriate".

We cannot say much more than does MTC, except to agree with their general approach and recommend some service areas that should receive consideration, (see map) namely:

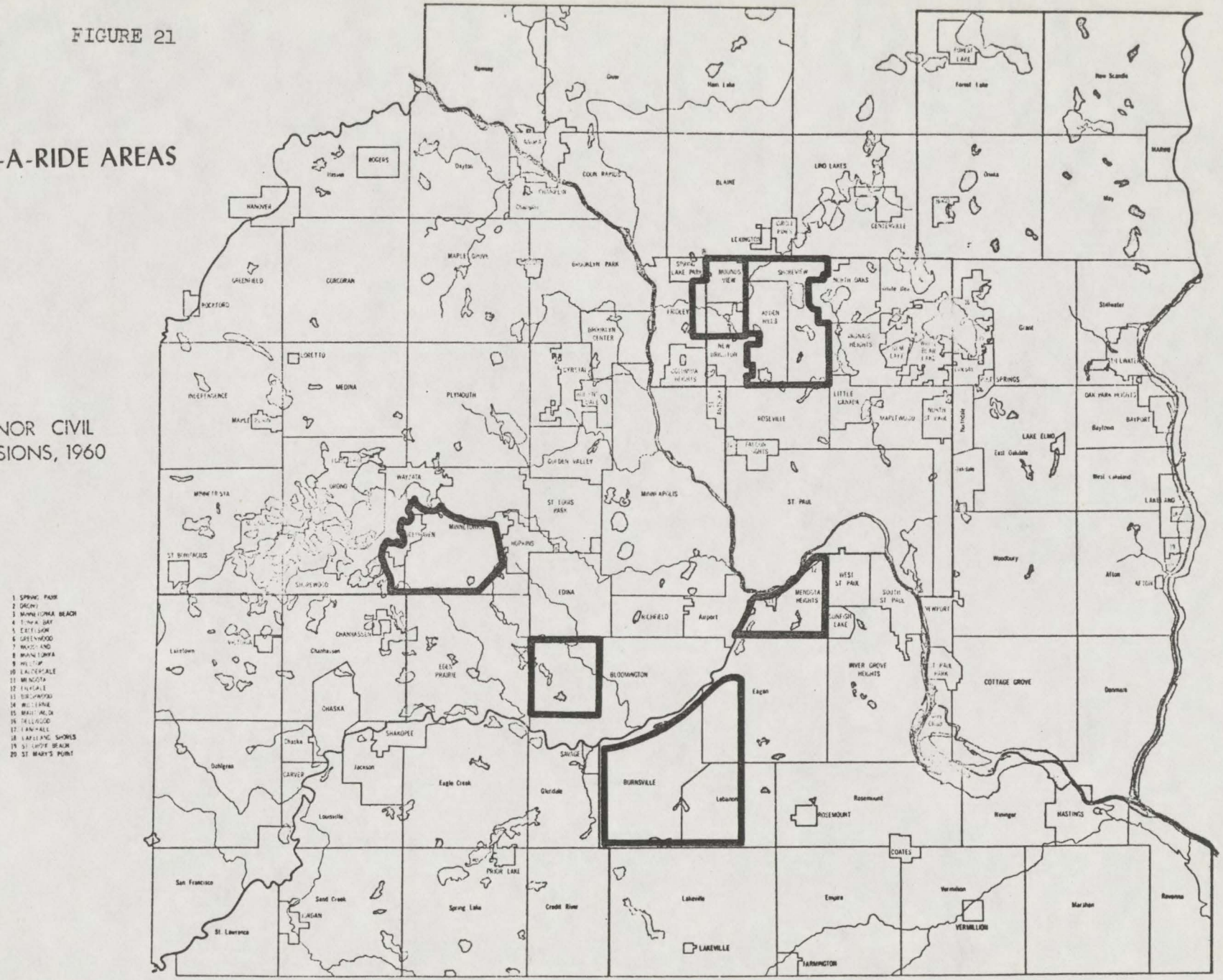
1) the area in Minnetonka bounded by Shady Oak Road, Lake Minnetonka, the Hennepin-Carver County Line and the C. & N.W. Railway.
2) the area in Bloomington west of France Avenue and north of Old Shakopee Road.
3) the area in New Brighton, Mounds View, and Fridley bounded by I-694, Highway 65, County Road J, and I-35W.
4) the entirety of Arden Hills and Shoreview.
5) the entirety of Mendota Heights.
6) the non-rural portions of Apple Valley, Eagan, and Burnsville.
7) Edina west of Southdale.

The above areas were selected because of their dispersed settlement patterns and low densities. We chose not to make a list of servable suburban centers, as these are well known and better described by publications of the Metropolitan Council.

FIGURE 21

# DIAL-A-RIDE AREAS

MINOR CIVIL DIVISIONS, 1960



Circulators.

A circulator is simply a conventional bus on a fixed route that provides service within a well-defined activity center. It might also be termed a "people mover" or "horizontal elevator". Fares are generally lower than for conventional routes because of the shorter distances involved. Frequency must be high, because the prime competitive mode is often walking. The circulator trip distance as a rule may be described as somewhat longer than a walking trip and somewhat shorter than an auto or conventional bus trip.

To date, MTC has initiated four such services. They are the QT routes, two in downtown Minneapolis and two in downtown St. Paul. They use minibuses, feature headways of approximately six minutes (20 minutes on Capitol QT route), and charge a fare of ten cents. They do not pay for themselves, but are looked upon as image makers for the MTC and as retail sales builders for the downtowns. Not often mentioned are a number of active circulators operated by institutions and private companies to carry out specialized transportation functions. They include:

1) Honeywell, Incorporated Inter-plant shuttle; Ridgeway-Roseville Plants; Ford Econoline Van.

2) University of Minnesota:
   a) Line 13A and G Intercampus bus, Minneapolis-St.Paul campuses via Como Avenue;
   b) Line 13U intercampus bus, Minneapolis-St. Paul campuses via University Avenue;
   c) Line 24 intercampus bus, East Bank-West Bank campuses.

   Lines 13 and 24 use MTC chartered buses;

   d) University Avenue Shuttle Bus, Minneapolis campus - Administrative Services Center; uses small van.

3) Hamline University, St. Thomas College, St. Catherine College, Macalaster College intercampus bus. Serves all campuses plus the University of Minnesota.

4) Northern States Power Company, downtown Minneapolis, loop via 4th Street, 2nd Avenue South, 9th Street, and 1st Avenue North uses step-van.

5) Sheraton Motor Inn, Thunderbird Motel, Marriott Inn, Airport Holiday Inn, Parkway Motel. The preceding are near the Airport and run free shuttle services for their customers, using small vans and station wagons.

6) Cedars Apartments - private bus service; connects apartments in Southeast Minneapolis, Cedar-Riverside area, and Edina with the University of Minnesota, downtown Minneapolis, and Southdale; uses modified school buses.

7) Metropolitan Medical Center; shuttle car to downtown Minneapolis for patrons; uses station wagon.

8) Various auto dealers provide free shuttle service to customers who leave cars for repairs.

9) Senior citizen hi-rises; shopper buses.

Some of the services listed above cover distances of several miles. We still call them circulators because they handle trips that are closed off from any outside travel patterns.

Some closed travel patterns are possible even where no large commercial center, employer or institution is involved. Such cases involve small, cohesive communities, little larger than neighborhoods, within which there are numerous trips. These places may be served either by fixed route circulators or by Dial-a-Ride. Today, only Valley Bus Company serves such a function, within Stillwater. It is not a true circulator, however, because of its long, 60-minute headway. The only other aspirant to the role, though it too was handicapped by hourly headway, was the experimental Brooklyn Center Bus, operated by Dickenson Lines and subsidized by the MTC. It attempted to tie Brooklyn Center together using two large loops. It was ultimately unsuccessful, due to the long headway and the frequent route changes it underwent. This report feels that the service deserved a better trial than it received.

The communities which this report considers candidates for circu-

lators occur either in the center city or among the more established suburbs (see map). They are: Minneapolis Pilot City, Minneapolis and St. Paul Model Cities, Southeast Minneapolis-Cedar Riverside, Anoka, Stillwater, Hastings, Wayzata, Hopkins, Excelsior, Columbia Heights, and Robbinsdale. The following activity centers are also candidates: Brookdale, Southdale, Rosedale-Har Mar, Signal Hills-Robert Street, I-494 (Bloomington-Richfield).

There is another variation on the circulator idea that bears mention here. It might be referred to as an anti-circulator, for its purpose is to divert traffic around crowded activity centers. Specifically, we are referring to the CBD's, through which buses are currently reduced to walking speed. In addition to a slowdown, the route through the CBD may cause a detour of some proportion to the through rider. In Minneapolis, the most obvious detours are: 1) between the routes that enter downtown on North 7th Street and those that enter through the Hennepin-Lyndale bottleneck; 2) between all the south side lines west of Cedar Avenue and the #4, #6 and #16 routes near the University. In St. Paul between the lines south of the Mississippi and those that enter downtown on West 7th Street are also detour routes.

In order to save time, we propose Ring buses around each downtown that would stop only to connect with lines entering the downtown. These buses would have to run at not greater than five minute headways, or they would not be patronized.

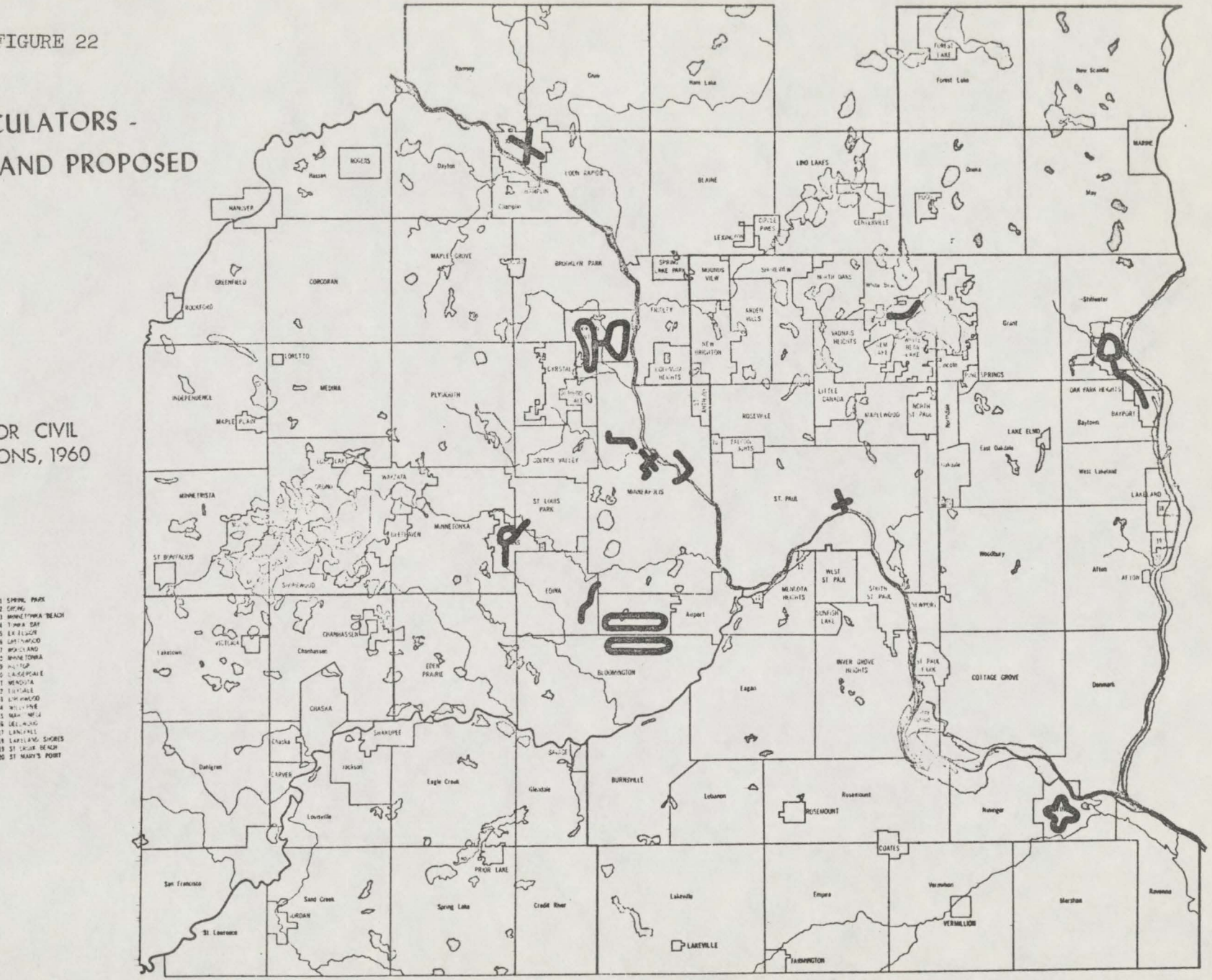
5. Supplemental Commuter Services.

Presently, a large portion of the multi-county metropolitan commuter zone remains rural. Within this rural commuter area are small towns that as yet have not been assimilated into the circulation system

FIGURE 22

# CIRCULATORS - EXISTING AND PROPOSED

MINOR CIVIL DIVISIONS, 1960



of the metropolitan area. Can these areas be served by public transit of some sort? A more appropriate question would be: can public transit come anywhere near to supporting itself in such environs? The answer: probably not. Is there a demand for such service? There is some, to be sure. This demand is partially met by the intercity bus routes of Greyhound, Jefferson, Zephyr, and S & A Lines. Together these services reach 46 non-CBD stops, on 14 routes, with 37 round trips daily. The stops fall into three catagories:

1. 31 small town stops;
2. 11 suburban area stops with some MTC service;
3. 4 crossroads stops.

This report takes the position that the intercity services should be:

1. recognized by the MTC as performing a limited commuter transit function;

2. be publicized by the MTC where such services augment the Transit Commission's own routes; and,

3. be augmented by the MTC where demand requires it.

Furthermore, there should be an agreement between the MTC and the four intercity carriers that would:

1. stop intercity buses at MTC transfer points;

2. provide for free transfer between the services;

3. coordinate fares and schedules.

The remainder of this section will outline ways in which the services may be coordinated.

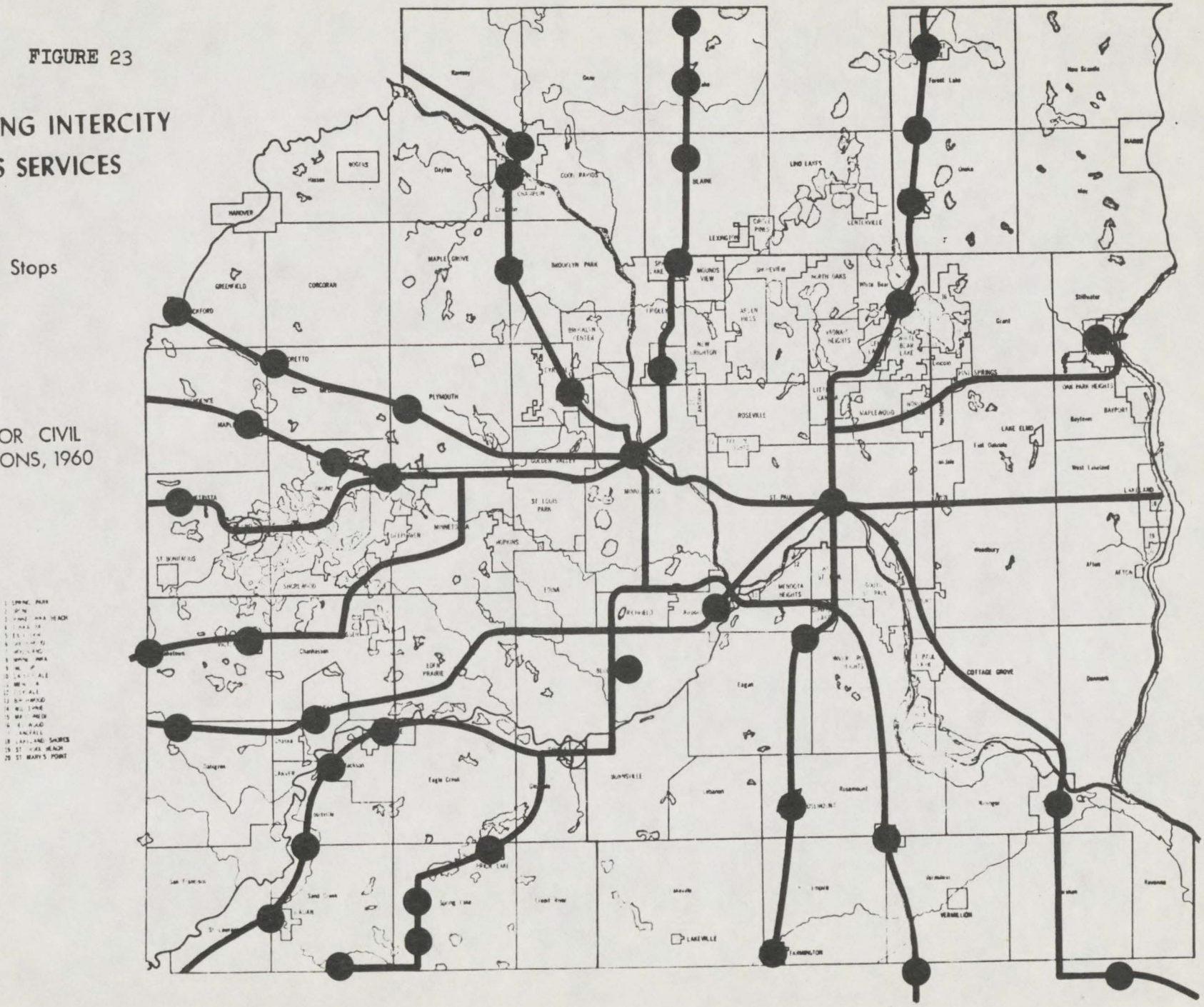
The overall idea of these special commuter services is to reduce MTC costs and involvement. As a rule, the MTC would have to initiate CBD-bound, morning rush hour trips. The intercity buses either arrive downtown by 6:00 a.m. or not until 9:00 a.m., completely avoiding the morning peak hours. Otherwise, the intercity lines can cover all off-peak services to the rural commuter areas, something the MTC can't afford.

FIGURE 23

# EXISTING INTERCITY BUS SERVICES

Stops

MINOR CIVIL DIVISIONS, 1960



Afternoon peak-hour trips could be provided by both, with the MTC filling in the gaps in the schedule. Intercity bus schedules tend to avoid the height of the rush hour because of traffic congestion. The MTC might wish to persuade these operators to change their policy by offering preferential freeway access (when it becomes available) in exchange.

The following list outlines in some detail the ways in which the services of the intercity operators and those of the MTC might be modified in order to achieve coordination.

1. Minneapolis-Bloomington (9601 S. Garfield), Greyhound, more than six round trips daily; could augment Bloomington Bus Company service, especially with the two late evening trips into Minneapolis and with Sunday service.

2. Minneapolis-Shakopee, Greyhound, five plus round trips; no existing MTC service; would require rush hour trips both ways.

3. Minneapolis-Belle Plaine, Greyhound, three round trips; same improvements as in number two above.

4. Minneapolis-Wayzata, Greyhound, S & A Lines, three or more round trips daily; could augment MTC route #51; would provide two additional afternoon rush hour trips and two well-spaced Sunday trips.

5. Minneapolis-Long Lake, Greyhound, three round trips; would augment MTC #51.
   Outbound, weekdays: would add currently non-existent outbound morning and noonday trips, plus an afternoon rush hour trip.
   Saturday-would add three trips to current single #51 trip.
   Sunday-would add two completely new trips where none currently exist.
   Inbound, weekdays and Saturday: would add needed pre-noon, afternoon, and supper trips.

6. Minneapolis-Maple Plain, Greyhound, three round trips, no current MTC service; would add same improvements as to Long Lake.

7. Minneapolis-Mound, S & A Lines, one round trip, only adds one outbound Sunday trip; otherwise service duplicates current MTC schedule.

8. Minneapolis-Watertown, S & A Lines, one round trip; excellent connections with MTC to serve intermediate points on MTC route #51.

9. Minneapolis-Robbinsdale, Greyhound, five plus round trips daily; could augment MTC route #14 as connecting express to downtown.
   Inbound weekdays: one morning trip connects with #14D; one afternoon trip connects with #14M.
   Outbound weekdays: one afternoon trip connects with #14M.

10. Minneapolis-Osseo, Greyhound, seven plus round trips daily; could connect with MTC #14 to serve intermediate points.

11. Minneapolis-Anoka, Greyhound:
    a. Weekdays inbound, eight trips; would supplement #26 and #27; particularly useful Anoka departures at 5:05 a.m., 9:23 a.m., 10:50 a.m., 10:45 p.m.
    b. Saturdays inbound, eight trips; would supplement #26 and #27; useful trips: leave Anoka at 5:05 a.m., 10:50 a.m., 12:02 p.m., 4:07 p.m., 6:26 p.m., 8:10 p.m., 10:45 p.m.
    c. Sundays inbound, seven trips: would supplement #27; useful trips: leave Anoka at 5:05 a.m., 10:55 a.m., 4:07 p.m., 6:26 p.m., 7:16 p.m., 8:10 p.m., 10:45 p.m.
    d. Weekdays outbound, ten trips; would supplement #26 and #27; useful trips: leave Minneapolis at 10:10 a.m., 2:00 p.m., 4:45 p.m., 5:00 p.m., 12:01 a.m.
    e. Saturdays outbound, eight trips; would supplement #26 and #27; useful trips: leave Minneapolis at 7:45 a.m., 10:10 a.m., 2:00 p.m., 5:00 p.m., 12:01 a.m.
    f. Sunday outbound, eight trips; would supplement #27; useful trips: leave Minneapolis at 7:45 a.m., 10:10 a.m., 2:00 p.m., 4:45 p.m., 5:45 p.m., 12:01 a.m.

12. St. Paul-White Bear, Greyhound, Zephyr, four round trips; could augment MTC route #15.
    Inbound weekdays: adds one needed noon hour, two evening runs.
    Outbound weekdays: adds two afternoon rush hour and one evening run.
    Weekends: no MTC #15 service.

13. St. Paul-Forest Lake, Greyhound, Zephyr, four round trips, would require additional morning rush hour and one afternoon rush hour trip.

14. St. Paul-Hastings, Greyhound, two round trips. MTC will initiate rush hour expresses in the future. Given that, Greyhound would add late morning and suppertime inbound trips; early afternoon and late afternoon rush hour trips.

15. St. Paul-Wescott-Farmington, Jefferson, two plus round trips. MTC would have to add rush hour trips except at 5:30 p.m.

16. St. Paul-Coates-Hampton, Jefferson, three or more round trips; MTC would have to add rush hour trips except at 4:30 p.m. (Operation may be considered low priority.)

17. Minneapolis-Victoria-Waconia-Norwood-Young America, Zephyr, one round trip; MTC would add rush hour service.

18. Minneapolis-Hamel-Loretto, Zephyr, two round trips; MTC would have to add rush hour service.

19. Minneapolis-Chaska (Cologne and Norwood as a possible extention), Zephyr, two round trips; MTC would add rush hour service.

20. St. Paul-Stillwater, Zephyr, one round trip; would augment MTC #12 and Valley Transit.
Weekdays: would add a good late morning inbound run, a late rush hour outbound on Fridays, and an early afternoon outbound run.
Saturdays: would add one early afternoon trip.
Sundays: would add one inbound and one outbound run.

21. Minneapolis-Savage, S & A Lines, one round trip; rush hour service is provided by MTC route #35N; S & A would add one afternoon rush hour run and one late morning inbound trip.

22. Minneapolis-Prior Lake (possible extension to New Prague), S & A Lines, one round trip. MTC would have to add morning rush hour service.

23. Minneapolis-Columbia Heights, S & A Lines, one round trip; could act as a connecting express service with MTC routes #10, #18 and #28.
Weekday: inbound connect with #10E.
outbound connect with #10D.
Saturday: inbound connect with #10C.
outbound connect with #10D.

24. Minneapolis-Johnsville-Ham Lake, S & A Lines, one round trip; MTC would add rush hour service.

25. Minneapolis-Highways 10 and 65, S & A Lines; would add late morning inbound and rush hour outbound to #25.

26. Minneapolis-St. Paul, Greyhound, Zephyr, Jefferson, more than 20 round trips. To Minneapolis MTC would add morning rush hour trips; from Minneapolis no extra trips are needed. To St. Paul would add morning rush hour trips; from St. Paul no extra trips are needed.

27. Minneapolis-International Airport, Greyhound, Jefferson, northbound, ten southbound trips; this service would augment MTC route #35P. This service would add late rush hour southbound trips in the morning and two northbound afternoon rush hour trips; off-peak headway would be about 1 1/2 hours.

28. St. Paul-International Airport, Greyhound, Jefferson, two southbound, four northbound trips; MTC would add morning rush hour trips to the airport.

The intercity buses would have to make some additional stops in order to connect with other MTC routes. These stops include:

1. Minneapolis outbound trips:
   a. Tenth and Hennepin.
   b. Tenth and Nicollet.
   c. Tenth and Marquette.
   d. Tenth and Second Avenue.
   e. Lake Street and I-35W.
   f. Seventh Street and First Avenue North.
   g. Sixth Street at Hennepin, Nicollet, Marquette and Second Avenue.
   h. Broadway and Emerson.

2. Minneapolis inbound trips:
   a. Broadway and Emerson.
   b. Lake Street and I-35W.
   c. 11th Street at Third Avenue South, Marquette, Nicollet Hennepin.
   d. Seventh Street and Nicollet Avenue.

3. St. Paul outbound trips:
   a. St. Peter at Fifth, Sixth and Seventh.
   b. Snelling Avenue and I-94.

4. St. Paul inbound trips:
   a. Wabasha at Fifth, Sixth and Seventh.
   b. Snelling Avenue at I-94.

5. Any freeway bus stops or stations which the MTC tentatively proposes to construct.

This report considers the following inter-city routes of those previously listed to be the primary ones for coordination with MTC services:

1. Minneapolis-St. Paul.
2. Minneapolis-International Airport.
3. St. Paul-International Airport.
4. Minneapolis-Shakopee.
5. Minneapolis-Long Lake.
6. Minneapolis-Osseo-Anoka.
7. St. Paul-White Bear.
8. St. Paul-Hastings.
9. St. Paul-Stillwater.
10. Minneapolis-Savage.
11. Minneapolis-Columbia Heights-Ham Lake.

One may ask whether Greyhound, Jefferson, Zephyr, and S & A Lines would ever agree to coordination of commuter services with the MTC. Commuter service is nothing new to Greyhound which runs substantial

services in several metropolitan areas. Zephyr Lines only recently departed the commuter service business when it sold its Mound service to the MTC. Finally, S & A Lines is a local, marginal operator that may readily accept a means of increasing its revenue. (S & A buses already stop at Seventh and Nicollet in Minneapolis to let off passengers.)

6. Special Events Services.

Annually, in the Twin Cities special events take place which attract many thousands of persons. Because of such high concentrations of people at these events and the resulting congestion, it is in the interest of the public, and local transit operators, that public transportation be provided whenever such attractions occur. The following section outlines the need for the service, the current status of special events service in the Twin Cities and a list of events and possible service improvements for each attraction.

Whenever persons gather for special events in the Twin Cities a crowd of several thousand persons can be expected at any one of a number of possible nodes (i.e., sports centers, convention halls, etc.). Periodically, the convergence upon, or divergence from, one of these nodes by the traveling public produces several problems. Basically, these problems are street and highway congestion, time delays, safety hazards, parking problems, and local air and noise pollution in and around the gathering place. Needless to say, public transportation should be designed to deliver persons to the event from 15 to 60 minutes in advance, and to pick them up no later than 15 minutes after the event. Also, service should provide access to a large portion of the serviceable Twin Cities area to mitigate the previously mentioned

problems.

Presently, local transit operators make little or no effort to coordinate their bus schedules with the occurrences of these special events. Exceptions to this statement must be made for M.T.C. service to Minnesota Twins' baseball, Minnesota Vikings' football, and Minnesota North Stars' hockey where express buses make runs to the stadium complex in Bloomington from both CBD's and Edina. Also, a limited amount of special events service is provided along the #6 Como Avenue line at State Fair time, and special QT service in downtown Minneapolis is occasionally made available when large conventions are in town. Charter service is also an exception to the special events service deficiency. Buses may be chartered from local operators by any group desiring personalized service. However, charter service is limited in its ability to serve the general population because it is contracted by one exclusive group. Thus, something of a service gap appears to exist as far as service to special events is concerned.

The following list has been compiled to provide the reader with an idea of the service improvements needed for each attraction. The list may not be all-encompassing but most of the major events in the metropolitan area have been included. All events are scheduled far enough in advance to allow transit planners time to provide necessary service. In addition, expected attendance figures are listed, when known, in order to allow an approximation of the magnitude of service needed. Finally, if the following improvements are to meet with any degree of success the public must be made aware of their existence. Advertising, such as the type already carried out by the Metropolitan Transit Commission, may be the key to success in this service area.

Twin City Area Special Events List and Recommendations:

1. Minnesota Fighting Saints' hockey, St. Paul Civic Arena; attendance 5000-16,500.
   Needed service: all St. Paul lines passing near the arena should provide service before the game and pick up passengers no later than 15 minutes after the end of each game. Special attention should be given to the more heavily patronized routes, such as lines #3, 16, 21, 14. QT service should also be initiated before and after each game to connect the civic arena with lines not passing near the building. 38 to 40 home games are played each winter.

2. University of Minnesota football, Memorial Stadium, University Campus, Minneapolis; attendance 30,000 to 55,000.
   Needed service: because of the acute parking problem on the University campus, very frequent service should be provided along routes #16, #2, and the revised #6 (see Master Route Guide). Headway should be on the order of a few minutes. Future express routes might be considered. Five or six home games are played each fall.

3. University of Minnesota basketball, Williams Arena, University Campus, Minneapolis; attendance 14,000-19,000.
   Needed service: same as for University football games. 12 or more home games are played each winter.

4. Minneapolis Auditorium events and conventions, downtown Minneapolis; attendance up to 15,000.
   Needed service: decreased headway on lines passing near the auditorium, such as routes #9, 10, 17, 18. QT service must be provided, especially for conventions; numerous events held each year.

5. St. Paul Civic Center events and conventions, downtown St. Paul, capacity of arena is up to 21,000.
   Needed service: approximately the same service as for Saints Hockey. QT service is especially important for conventions. The civic center commission hopes to schedule more than 100 event-days each year.

6. Northrop Auditorium events (Minnesota Symphony Orchestra, Metropolitan Opera, many others), University Campus, Minneapolis, capacity about 4000.
   Needed service: same as for University football and basketball but on a smaller scale.

7. State High School Basketball Tournament, Williams Arena or St. Paul Civic Center; attendance 10,00 to 17,000.
   Needed service: same as for the University basketball or Civic Center events; held each March.

8. State High School Hockey Tournament, Metropolitan Sports Center, Bloomington; attendance about 15,000.

Needed service: same as for North Star Hockey; held late each winter.

9. State High School Football Tournament, This is a new event that is certain to grow in popularity as the other high school sports tournaments have. This event may warrant future service. Because the location is unknown, and possibly subject to change with growth in attendance it should be watched and served as needed.

10. Metropolitan Sports Center events (concerts, rallies, etc.), Bloomington, attendance up to 20,000.
Needed service: same as for North Star Hockey.

11. Minnehaha Park Ethnic celebrations (Svensgarnestag, Norwegian Day, Oktoberfest, etc.), attendance often up to several thousand.
Needed service: more frequent service on lines #7 and #20 in Minneapolis. An extension of the #14 in St. Paul, across the river to the park might be beneficial.

12. Minneapolis Aquatennial events, attendance of several thousand for various events; the parade may draw 50,000 and more.
Needed service: For events at Lake Calhoun, and vicinity, frequent service on lines #12, #17, and #21. A possible QT shuttle service around the lakes should be considered. Downtown parade affects all CBD-oriented routes. QT service should be provided. Held each July.

13. St. Paul Winter Carnival Parades, downtown St. Paul.
Needed service: QT, plus all other CBD-oriented routes should have frequent service.

14. Uptown Art Fair, vicinity of Lake and Hennepin, Minneapolis.
Needed service: additional service on routes #6, #12, #17, and #21.

15. Miscellaneous events: Events such as the Walk for Development (25,000 plus participants), political rallies, and the like which are held at infrequent intervals, or at undetermined locations should be served as needed because of their large attendances.

Existing Services.

1. Twins baseball, Metropolitan Stadium, Bloomington; attendance 3000-40,000.
Needed service: continue current express routes. For furthur future service see Diversified Center recommendations. About 80 home games are played each summer.

2. Vikings football, Metropolitan Stadium, Bloomington; attendance 45,000-50,000.

Needed service: same as for Twins baseball; 9 or 10 homee games are played each year.

3. Minnesota North Stars' hockey, Metropolitan Sports Center, Bloomington; attendance 14,000-16,000.
   Continue the express service along the same routes as those run for Vikings and Twins games. 38 to 40 home games are played annually.

4. State Fair, State Fair Grounds, St. Paul; attendance of over one million during a two-week period.
   Needed service: continue special Fair service along Minneapolis route #6. Better headway (five to ten minutes) along St. Paul routes #4 and #5. Experiment with express service from various parts of the Twin Cities, such as the Har-Mar Redball (#1).

5. Charter service, no recommendations; provide as needed.

Conclusions:

a) Special events service should be provided regardless of location, time of day, or day of the week.

b) In general, service should deliver persons to the event from 15 to 60 minutes prior to the start of the event. Persons should be picked up by all lines no later than 15 minutes after the event has ended.

c) For the new special event services to be accepted by the public, some type of advertising campaign should be employed.

d) Special event service is a service that must be provided in order to relieve traffic congestion, time delays, parking problems, safety hazards, and air and noise pollution, and if for no other reason service should be provided as a public convenience.

G. Waiting Shelters.

MTC has wisely embarked on a program to provide their busiest bus stops with waiting shelters. Previous to MTC ownership, only the Nicollet Mall shelters and a handful of institutional structures and outdated streetcar facilities were in existence. MTC purchased four shelters of

different appearance and specifications and installed them around the metropolitan area as a test. One type of shelter, constructed with plexiglass, was selected to be built at a cost of about $3000 each. The order of placement is according to the highest ridership volume per stop, with none of this type of shelter intended for the CBD's.

Since 1971, 52 of these shelters have been installed. At present they are unheated, but plans call for installation of demand-actuated heat lamps in early 1973. By 1982, 449 shelters are scheduled to be available. The Suburban Transit Survey indicated that the presence of a heated shelter was quite important, considering the severity of the local winters. This report concludes, therefore, that every effort should be made to provide this service.

However, one must question the need for the construction of numerous bus stations in the CBD's and suburban diversified centers, as proposed by the MTC's Transit Development Report. Before work proceeds on these stations the cost of their construction should be carefully weighed against the better utilization of such funds for financing route extensions and additions, headway improvements, and operations in general. As has been noted, the comprehensive plan for the erection of the heated, plexiglass shelters may sufficiently meet the public demand for shelter.

H. The Bus Driver Interviews - MTC Management-Labor Relations.

The bus driver has been described as a sort of shock absorber, smoothing out the differences between transit management and the riding public. This observation holds true for the Metropolitan Transit Commission. Personal interviews with drivers revealed a picture of an

employee who finds himself caught in the middle and victimized, to a degree. Briefly, this section will enumerate some of the problems encountered by the drivers plus suggestions for improved labor-management relations.

A typical situation, in which the bus driver will find himself in the role of middleman, is that of the driver of a street express. The driver is instructed by the company to discharge passengers only at certain designated stops. However, frequently someone gets on who does not realize this situation and tries to halt the bus at an unauthorized stop. If the driver lets the passenger off, he risks disciplinary action by the management for stopping at an undesignated point. If the driver refuses to stop, the passenger will frequently complain to the management. In such situations, several drivers indicated, the management will side with the passenger against the driver.

Another problem area for the driver is the modification of a schedule by an experienced driver, in order to match what he sees as his or the passengers' needs. The driver will perhaps start his run late in order to avoid killing time when given a "padded" schedule. Also, he may arrive at a transfer point early, knowing his passengers will miss a connecting bus if he adheres to his schedule.

The drivers interviewed all had suggestions for schedule improvements. They complained of schedules with "dead spots", causing unnecessarily slow speed. Others complained of schedules which required them to "run hot" in an effort to stay on time. "Running hot" (ahead of schedule or over the speed limit) is something that virtually every driver finds necessary to do, although it is grounds for reprimand by the management. The drivers interviewed seemed very sure of their knowledge of point-to-point travel times and passenger flows under various circumstances.

They were convinced that schedule department personnel knew somewhat less than they did on this point.

Few drivers had much respect for the management. Certainly one does not expect great affection between management and labor at all times, but the drivers felt that numerous operating details caused problems because of an insensitive management. For example, until recently drivers were forbidden to use convex mirrors (rear view) on the right hand sides of the buses, despite the drivers' insistence that conventional mirrors left a dangerous blind spot. The Flxible (trade name) buses recently acquired are another example of equipment purchased without driver input. Though the buses are of a standard design, manufactured for over a decade, they have a serious windshield glare problem that hampers the driver's vision at night.

Another problem is that buses #271-349 (among the first Flxibles delivered) have only six-cylinder engines, but are equipped with air conditioning. These engines are incapable of keeping a tight schedule while the air conditioning is running. That is, the engines are too overloaded to be able to pull the buses along while making any kind of time. Once again the driver faces a dilemma. Should he keep his schedule (i.e, turn off the air conditioning) and have hot, angry passengers, or vice-versa? Some drivers compromise, by turning the air conditioning off during acceleration, with acceptable results. This, however, is beside the point. Why did the MTC purchase vehicles that were known to fall short of the local operating requirements? The MTC has since purchased only eight-cylinder engines which the drivers agree are equal to the task. There were also disagreements with the management over wages and benefits, but these complaints are beyond the scope of this report. They should be noted though as existing and as contributors

to less than optimal relations with management.

What does emerge is the impression that the drivers represent a valuable source of information regarding operational data. However, this source remains untapped, to any great degree, by the management. This report contends that management, especially the scheduling department, could improve its efficiency and the quality of its work by making driver consultation a regular means of gathering data. On a broader level, we also recommend that an ombudsman-type service be established expressly for the purpose of alleviating and airing differences between management and labor, and also for the purpose of data collection in other areas of operations.

## I. Operating Equipment.

The backbone of every transit system is its equipment. Besides being a "box on wheels" that carries passengers, transit equipment plays several other important roles. Modern, aesthetically-pleasing vehicles not only are an aid in attracting additional ridership but also provide for more dependable, maintenance-free service, so important in our often inclement Minnesota weather. Transit equipment also affects the system speed, access, and coverage which may or may not make public transportation auto competitive. With these, and the many other roles of transit equipment in mind, this report will analyze the Metropolitan Transit Commission's fleet with respect to current and future performance needs and problems.

### 1. Equipment Inventory

The initial question to be dealt with is what type of transit equipment does the Metropolitan Transit Commission own and operate. The table

included in this section outlines in detail the model, capacity, quantity, and age of the various buses which comprise the MTC's fleet. A brief note of explanation regarding the table will aid in understanding the system. GMC Model 5105 is the oldest equipment in the fleet and will be the first to be replaced by newer models. GMC Model 4104 is a "highway" coach obtained from Zephyr Lines when MTC took over their Minnetonka area runs. Model 5303 is the "new look" GM bus without air conditioning. Also acquired from Zephyr Lines were three GM buses of the same model (5303) but with air conditioning. The balance of the fleet is comprised of Flxible Corporation vehicles purchased within the last two years. The buses come with engines of six or eight cylinders (including express buses) and are all air conditioned. The Metropolitan Transit Commission also owns 16 mini-buses of which 12 are Flxible products and four are Twin Coach products. Thus the MTC maintains a fleet of 709 buses (seven of which are in storage) with an average fleet age of eight years. However, at any one time 7.5% to 10% are garaged for maintenance reasons.

2. Fleet Age and Merits.

The MTC should be commended for its initiative in fleet renewal and expansion. Up to the time of the MTC take-over, the bus fleet was characterized by old vehicles with an average age of about 13 to 15 years. New equipment purchases since then have lowered the fleet age to about eight years. The ultimate goal is an average age of around five to six years per vehicle, making the MTC's fleet one of the newer ones in the nation. A newer fleet obviously has its advantages. Maintenance problems are considerably lessened, thereby assuring patrons of more dependable, on-time service. This is an especially important characteristic in the Twin Cities where extremes of winter cold and

TABLE 2

MTC - TRANSIT OPERATING DIVISION

FLEET INVENTORY

| QUANTITY | YEAR | MODEL | SEATING CAPACITY | CONSECUTIVE COACH NUMBERS (EXCLUDING DELETIONS) | AGE IN MODEL YRS. END OF 1972 |
|---|---|---|---|---|---|
| 96 | 1953 | GMC 5105 | 51 pass. | 1010-1239 | 20 |
| 1 | 1954 | GMC 4104 A/C | 41 pass. | 53 | 19 |
| 117 | 1954 | GMC 5105 | 51 pass. | 1240-1399 | 19 |
| 49 | 1963 | GMC 5303 | 53 pass. | 101-150 | 10 |
| 25 | 1964 | GMC 5303 | 53 pass. | 151-175 | 9 |
| 25 | 1965 | GMC 5303 | 53 pass. | 176-200 | 8 |
| 55 | 1966 | GMC 5303 | 53 pass. | 201-255 | 7 |
| 3 | 1967 | GMC 5303 A/C | 53 pass. | 33-35 | 6 |
| 12 | 1971 | FLX.511-KE-F6 Q.T. A/C | 17 pass. | 60-71 | 2 |
| 15 | 1971 | FLXIBLE A/C 111CC-D61 | 47 pass. | 256-270 | 2 |
| 78 | 1971 | FLXIBLE A/C 111CC-D51 | 51 pass. | 271-348 | 2 |
| 156 | 1972 | FLXIBLE A/C 111CC-D061 | 51 pass. | 349-504 | 1 |
| 48 | 1972 | FLXIBLE A/C 111CC-D061 | 47 pass. | 505-552 | 1 |
| 18 | 1972 | FLXIBLE A/C 111CC-D061 | 43 pass. | 553-570 | 1 |
| 4 | 1972 | TWIN COACH TC-25-453 A/C | 20 pass. | 72-75 | 1 |

FLEET IN USE- 702
STORAGE - 7
TOTAL FLEET - 709

Average age (in model years) of buses in use - 8 years.

Storage buses for possible use if needs expand in 1973: 7 GMC 5105 - 1953

NOT IN OPERATING CONDITION:
1 GMC 5105 - 1953
2 GMC 5105 - 1954
8 GMC 5105 - Dickenson Lines

summer heat are common.

The MTC's fleet also includes express coaches with deep-padded bucket seats and high speed transmissions for freeway driving. Used largely on express runs, these vehicles are very popular among MTC patrons and have considerably improved the image of the fleet in the eyes of the public. The new buses are generally equipped with eight-cylinder engines which provide added acceleration and speed. These larger engines have the potential for giving more on-time performances while improving system access and coverage, whereas the smaller six-cylinder engines (found in earlier models) could not do this as effectively.

3. Equipment Problems

However, the MTC's fleet is not trouble-free. Problems exist in the equipment, some of which may be attributed to the MTC and some to the manufacturers. The more important problems are:

a) Ease of Boarding.

Most buses built today are constructed on a truck-type frame. This means that the vehicle floor is high off the ground. Passengers, therefore, have three large steps to negotiate upon boarding and leaving the bus. These high steps, being a hazard and nuisance for the elderly and handicapped, also slow down the overall system speed. Because it takes so long for persons to board and exit, many minutes of traveling time are lost. The amount of time lost on a line which is a heavy carrier of elderly persons, e.g., Nicollet Avenue, is quite substantial. The blame, in this case, rests with the manufacturer.

A closely related problem is the narrow door width on current vehicles. Congestion often occurs at the exits as passengers attempt to board and leave via the same door. Again, a considerable amount of

traveling time is lost. Designs which allow efficient boarding and departing disappeared with the streetcar. Improvements in step height and door width are well within the capabilities of transit vehicle manufacturers. European buses are often one or two steps closer to the ground and have wider doors, especially in the front. However, General Motor's and Flxible appear to find it more convenient to "shoehorn" bus bodies onto borrowed frames (i.e. truck frames) rather than to design a pure bus. A pure bus also has a lower center of gravity which diminishes some of the pronounced side-sway of current buses.

b) Windshield Glare.

Another very dangerous problem is front windshield glare on most American-made buses. Light reflects off the flooring material inside the bus and strikes the windshield causing a dangerous glare problem for the driver. After the flooring is worn the glare does subside somewhat. According to Metropolitan Transit Commission personnel, there is no American-built bus without this characteristic. Though a problem dangerous to occupant safety, this has gone untouched for many years by the bus manufacturers. There is no excuse for not altering the flooring material or windshield design in an effort to alleviate this problem completely. The MTC's newest Flxible buses with their flat, angled windhields are particularly prone to this problem.

c) Engines.

The MTC, in its first new equipment purchase, ordered 78 buses with six-cylinder engines and air conditioning; engines too small to handle the loads placed upon them. When these vehicles are carrying full loads, with the air conditioning running, they are incapable of enough acceleration to enable drivers to keep on schedule.

Why then did the MTC purchase these buses? MTC officials claim

that they had had no prior experience with vehicles of that engine size, equipped with air conditioning, and therefore did not know what the consequences would be. This is true, to a degree. However, the MTC did own three GM six-cylinder buses with air conditioning, for a time, prior to these disputed acquisitions. Fortunately, all recently purchased vehicles are equipped with eight-cylinder engines capable of bearing the load placed upon them. Still, the Metropolitan Transit Commission is "stuck" with 78 underpowered buses.

d) Interior Seating.

Passenger comfort is another important, equipment-related consideration. Since the days of the Twin City Lines, the MTC has taken several strides towards improving seating, but not without problems.

The same Flxible buses with six-cylinder engines and air conditioning also posess a very unique type of seat constructed of hard, smooth plastic. Durable they are; comfortable they are not. Indeed, when these buses are decelerating or turning one may find himself slipping ungracefully onto the floor. While these seats will probably last a life time, there is no excuse for their having been purchased, especially if passenger comfort is sacrificed. More comfortable seats are available, and have been installed in the newest MTC acquisitions. But since the introduction of these plastic seats passengers have lodged many complaints.

The point of this seating problem is simply that, to a degree, the public is not getting the most for its money. Passenger comfort is an integral part of the Metropolitan Transit Commission's attempt to provide auto-competitive service. Therefore, it is important that comfort be maximized. The price differential between these plastic seats, and one of a padded type (as found in express buses) is not prohibitive. If

the public is going to pay tax dollars for support of an auto-competitive transit system, the operators should keep a close eye on such details.

e) Equipment Deployment.

To make the most efficient use of transit equipment on various routes, buses should be deployed according to the speeds required by the schedule and the vehicular ability to meet those speeds. The MTC, with the exception of express services, has no real policy of deploying buses according to the above criterion. Often, one will find a six-cylinder engine bus operating on routes which require adherence to tight schedules or which require high speed driving. The result is that drivers are unable to maintain scheduled times. For example, the East River Road route to Anoka involves high speed driving. Yet, six cylinder Flxibles are often assigned to this run with the afore-mentioned results. Again, the MTC needs to turn more attention to detail and deploy buses according to engine size and the particular route needs. When this is done trip speed can be increased.

f) Destination Signs.

Recently, the MTC spent several thousand dollars purchasing small front and rear destination signs. In light of the way that many drivers use these signs one wonders why the money was spent. The chief violation is the failure to display the proper cutback letter after the route number. Problems are especially prevalent on new routes, such as those recently instituted in the I-35W corridor. When the improper letter is displayed on these express runs an entirely different route is designated, i.e., 35C and 35D are two separate routes. Since these signs are used to display information, MTC supervisors should enforce their proper usage. Once again, the MTC needs to pay closer attention to such details designed to aid the riding public.

g) Fuel Shortage - Pollution Controls.

This winter marked the first major occurence of the fuel shortage problem. The Metropolitan Transit Commission, thus far, has been able to avoid a fuel shortage only through the grace of Canadian refineries. Yet, in the future will this always be true? A system dependent on diesel fuel always runs the risk of fuel shortage. But because public transportation may be more heavily relied upon by the public when the problem grows more acute, the MTC should urge that fuel priorities be established for transit. Environmentally, transit fuel priorities are desirable. Fewer automobiles on the road means less pollution, a fact of growing importance in our urban areas. Transit can pick up the slack left by the automobile only if these priorities are established.

4. Future Equipment.

Fleet renewal and expansion is a critical element in transit operations. If service is to be auto-competitive, route mileage must be increased, headways reduced, and new services initiated. To do this, a constantly expanding fleet is required in order to meet the needs of the public. Currently, the MTC is hard pressed for equipment, especially during rush hour. 646 vehicles are used during peak hours, which is about the naximum number of buses available if one allows for 10% of the fleet in maintenance.

The MTC does recognize this problem and has initiated a comprehensive fleet expansion and renewal program. Up to 1975, 93 new buses will be purchased annually to replace the oldest vehicles in the fleet. In this case, GM model 5105 buses will be the first to go as they are approaching 20 years of age. In addition to this fleet renewal, 50 additional buses will be purchased annually. These additional buses will be used to expand present service levels to those demanded by the

public. Starting in 1976 about 63 buses per year, or one-twelfth of the fleet, will be purchased for renewal purposes, plus the 50 additional vehicles for fleet expansion.

Thus, the MTC is looking to the future with an apparently comprehensive plan. The transit commission should keep close watch on their service levels and the number of vehicles needed to meet them. Hopefully, the MTC will never be hard pressed for vehicles, always retaining a surplus for service expansions.

Also, the MTC should be alert for new design vehicles such as the fabled "superbus". General Motors and Booz-Allen Researchers, in conjunction with several transit authorities, are working on radical new vehicle designs for urban transportation. While little information is apparently available on the exact designs, these "superbuses" will use new engine types (possibly turbine), more streamline cabin designs, and a lower frame, to name but a few features. If such buses become available in the near future, this report would urge that the MTC experiment with these vehicles.

5. Summary and Recommendations.

The MTC's attention to its operating equipment has been, in general, quite good, especially regarding fleet renewal and expansion. This report has outlined several problems dealing with operating equipment, most of which the MTC recognizes. Any transit operation will encounter it's share of equipment problems but as long as action is taken immediately to remedy the situation there is no great cause for alarm.

To alleviate these problems and to provide for service commensurate with public demand, the following recommendations are made to the MTC:

1) Strongly urge transit vehicle manufacturers to improve their

design and construction of new vehicles. Specifically, the manufacturers should allow for:

a) lower frames on buses (i.e. dispose of truck frames) to facilitate ease and speed of boarding, especially for the handicapped and the elderly;

b) wider doors;

c) alleviation of windshield glare through the use of new floor materials or different windshield designs;

d) as an option, luggage storage space for shoppers or persons carrying suitcases, etc. might be provided;

e) lower interior and exterior noise levels through the use of special acoustical material.

2) Purchase only vehicles with eight-cylinder engines in order to provide for improved system speed, access, and coverage. Air conditioning is also recommended for every vehicle.

3) Order only the deep padded bucket seats, found in current express buses. The cost differential between this type of seat and any inferior form is not prohibitive. This improved aspect of passenger comfort can be important in providing auto-competitive service.

4) Replace the hard plastic seats in buses #271-348 with padded bucket seats.

5) Deploy vehicles on routes according to the route speed and the engine size of the bus. Do not use six-cylinder engines on routes that require high-speed running (e.g., routes #26, 27, 35, etc.) or routes requiring much starting and stopping within tight schedules (e.g., #16 and #21 in Minneapolis).

6) Enforce the proper usage of destination signs, especially, the

rear and side signs. New routes must be closely watched to assure that proper information is displayed.

7) Through governmental action attempt to achieve a fuel priority during times of shortage so that public transportation need never be reduced.

8) Search for and install new pollution control devices on all vehicles in an effort to further reduce emissions.

9) Dispose of all GM models 5105 buses as soon as possible.

10) Continue fleet renewal and expansion policies with special attention to:

   a) fleet expansion above the predicted 50 vehicles per year;

   b) search for and use of new innovative designs such as the GM RTX or any other "superbus" design when available;

   c) expansion of mini-bus fleet, especially with an eye toward use in community circulator, diversified center circulator, and dial-a-ride services, plus low patronage conventional routes. The Twin Coach mini-bus is preferred by this report over the Flxette.

11) Urge the state and federal governments to provide more funding for vehicle purchases and equipment improvements.

# V. ROUTE RECOMMENDATIONS.

The following sections contains suggestions for route redeployment, extensions, and additions in the Twin Cities area. Unfortunately, the authors were limited by the lack of time and financial resources from obtaining patronage estimates and exact cost data for each recommendation.* More in depth analysis by the MTC may prove that the costs of implementing certain changes, or additions, may outweigh the potential benefits. When a more detailed analysis is conducted, though, the improvements in public service should be carefully measured against the supposedly great operating costs (as recommended by Simpson and Curtin in their Standards of Service Policy). Even though the authors were unable to answer the question of cost and patronage in detail for each change the reader should note that there were definite route structure improvement criteria designed to provide improved transit service to a broader market. They are as follows:

1) Coverage. The changes suggested are designed to improve route coverage in the Twin Cities area, especially in the suburbs. While suburban coverage is in need of the most improvement, the authors do recognize the difficulties involved in serving lower density, auto-oriented areas. But with the growing concern over fuel shortages for automobiles, increasing street and highway congestion in the suburbs, and growing air pollution from cars improved suburban transit service is necessary.

2) Access. The route recommendations attempt to maximize access to central city and suburban shopping and employment centers

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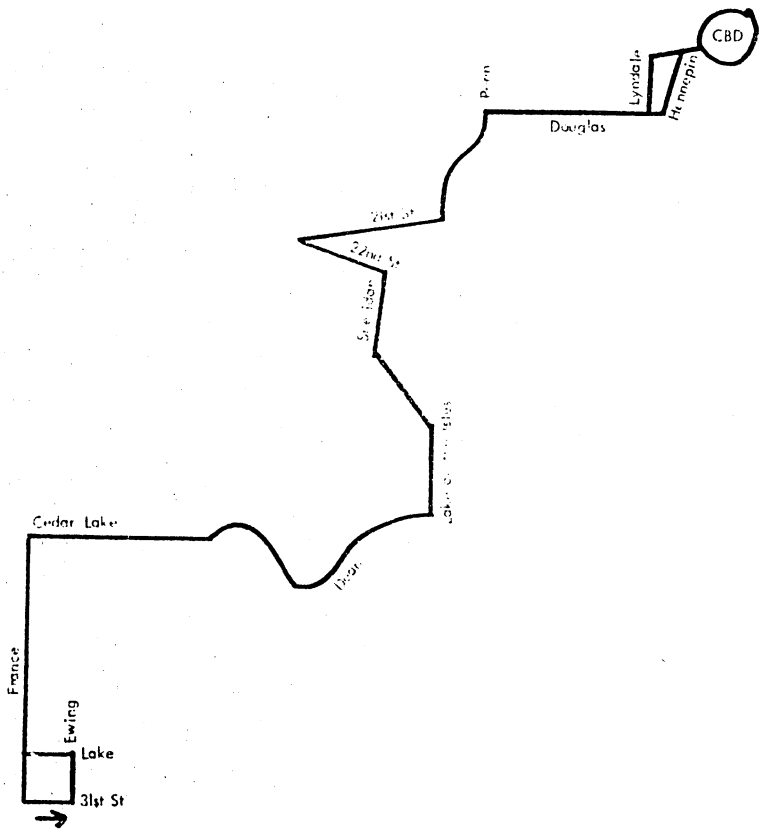
*While a route-by-route breakdown of costs and patronage is not included, the reader should refer to Chapter V (B) on Costs of Implementation for system-wide cost and patronage estimations at various service levels.

for residents in all areas of the Twin Cities. Reverse commuting to suburban centers needs much improvement as well as suburban access to suburban employment and shopping areas.

3) Simplification. As recommended by Simpson and Curtin in their Standards of Service Policy, the route suggestions attempt to eliminate needless complexity, e.g. excessive branching and looping, improperly placed cutback points, etc.

# A: MASTER ROUTE GUIDE

## MINNEAPOLIS




### No. 1 Kenwood

1) Annex 17B (Depot and Cedar Lake-Lake and France). This move was recommended by Simpson and Curtin in 1968. 17B and 1B currently have some of the skimpiest service anywhere. There are two concievable reasons for their meeting as they do:

a) 17B gives access to the Lake and Hennepin commercial area, as well as connecting with route 21A Lake.

b) The C. and N.W. Railroad crossing is sometimes blocked by freight trains.

Reasons for the change include:

a) A faster running time to downtown.

b) Single transfer service to St. Louis Park for the entire Kenwood line. Two transfers are currently necessary.

2) Loop terminus among apartments south of Lake and France.

3) Eliminate 1A and current 1B cutback. There are no outstanding reasons for either, and both prevent access to St. Louis Park and Knollwood Center.

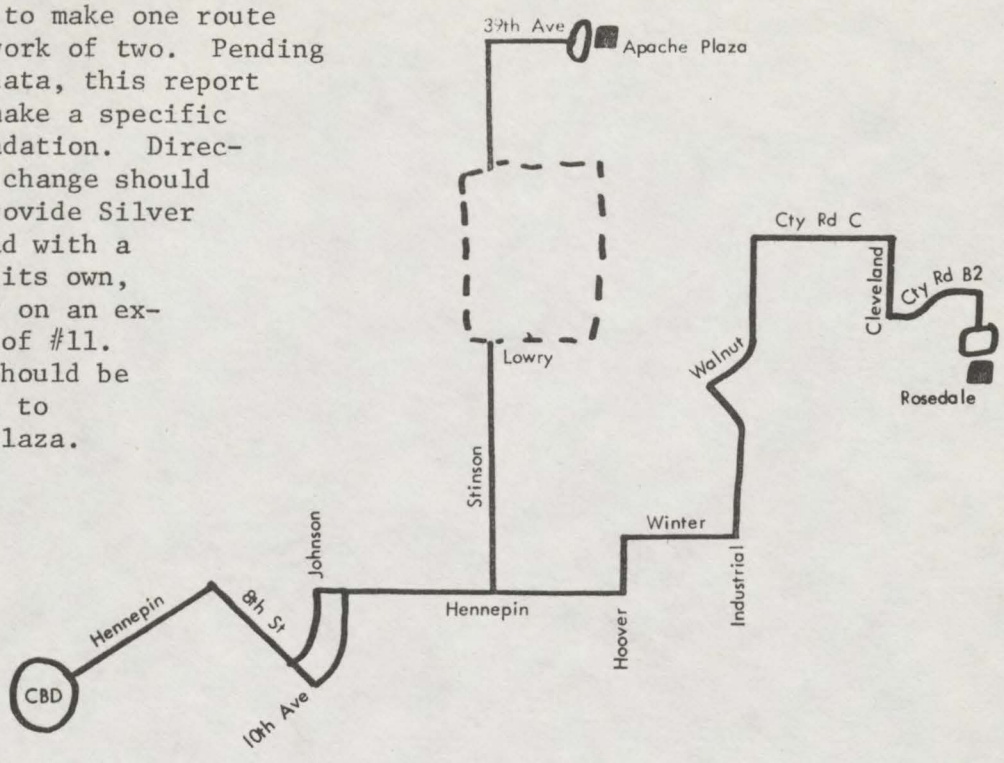
### No. 1 St. Anthony

1) Annex 4B (37th and Stinson-Apache Plaza). Eliminate current 1B cutback. This will give access to Apache and eliminate outdated cutback.

2) Annex 4A (8th and East Hennepin-Johnson and Hennepin). This is part of a larger plan to shift routes into more built-up neighborhoods from the area vacated by I-35W.

3) Relocate from McKinley to Stinson between Lowry and 29th Avenue. This is an unnecessary detour, made necessary several years ago by the then wretched pavement on Stinson.

4) Current 1A loop is an attempt to make one route do the work of two. Pending better data, this report cannot make a specific recommendation. Direction of change should be to provide Silver Lake Road with a line of its own, possibly on an extension of #11. Access should be provided to Apache Plaza.




5) Extend 1G to Rosedale via Industrial, Walnut, County Road C, Cleveland, and County Road B2. Relocate existing 1G from Hoover and Hennepin to Broadway and Industrial via Hoover, Winter and Industrial. Abandon remainder of current loops. Extension will give access to Space Center Industrial Park, small industries and truck terminals on County C, B2 and Cleveland, as well as Rosedale.

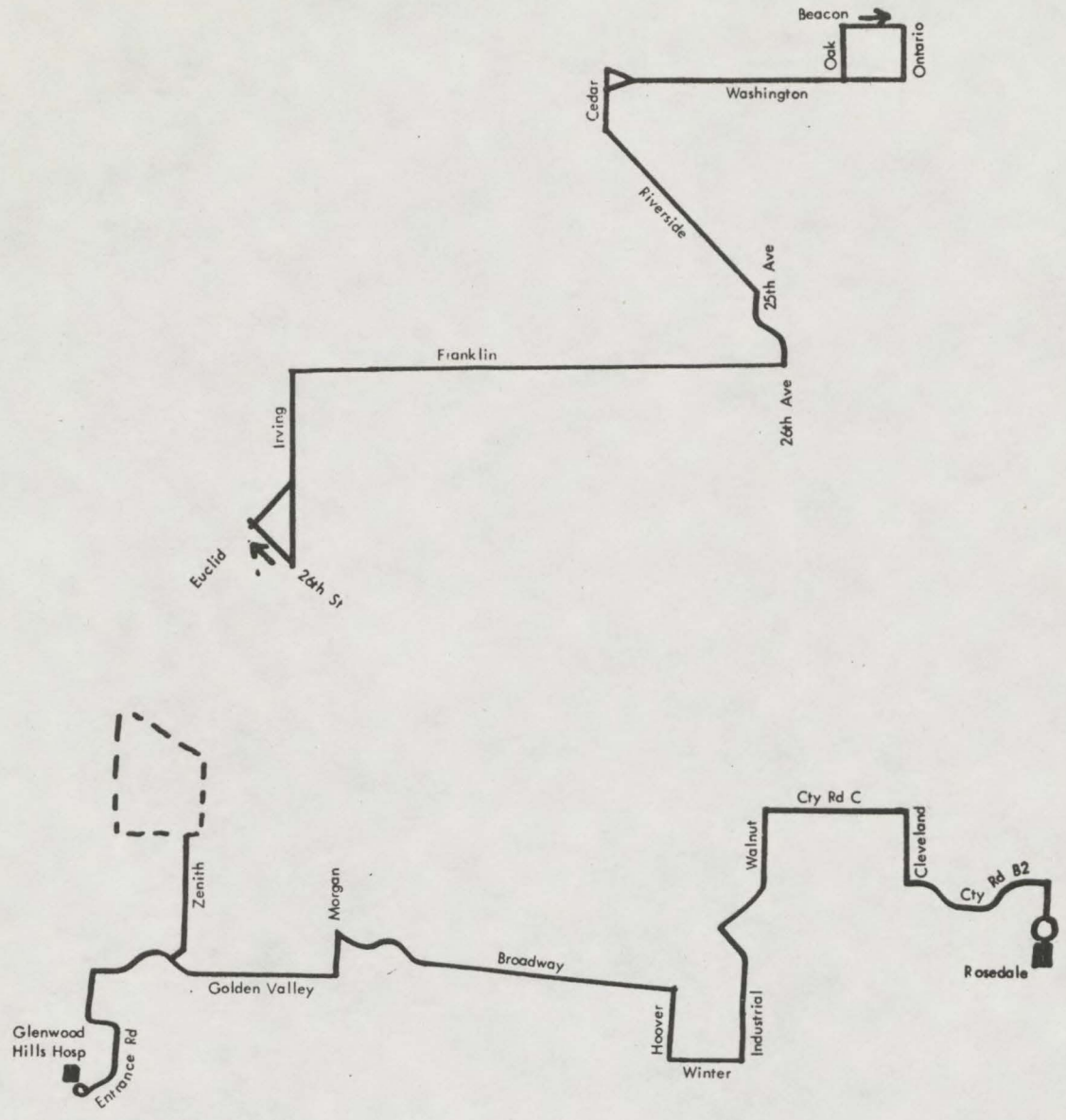
No. 2 Franklin Crosstown

1) Eliminate 2A cutback. Extend all service to the University of Minnesota (Oak and Washington). This is too big a traffic generator to ignore.

2) Extend west terminus to 26th and Irving via Franklin and Irving. Loop on 26th and Euclid. This will serve area east of Lake of the Isles currently outside coverage area of existing lines.

No. 3 Broadway Crosstown

1) Relocate from 13th Avenue N.E. to Broadway between Marshall and Washington Street Northeast. The Broadway bridge used to empty onto 13th, but no longer. Running time could be cut by two to three minutes with this change.




2) Eliminate 3A cutback at Golden Valley and Xerxes. This is merely the city limits. Run through to Meridian Drive.

3) Change 3A cutback at Broadway and Washington Avenues North to 3X.

4) Move 3A cutback east to Fillmore Street. This would be used when #1 does not run, saving useless miles through all-industrial areas.

5) 3B at Meridian Drive should possibly be extended north to Oakdale. Best route is currently vague. This would allow connections to Robbinsdale and Crystal.

6) 3B eastern terminus should extend north and east to serve Space Center, County Road C and Rosedale during rush hours. Possibly

off-peak service should extend to Rosedale via County Road B and Snelling.

No. 4 Johnson

1) Cede 4B (37th and Stinson-Apache Plaza) to route 1.

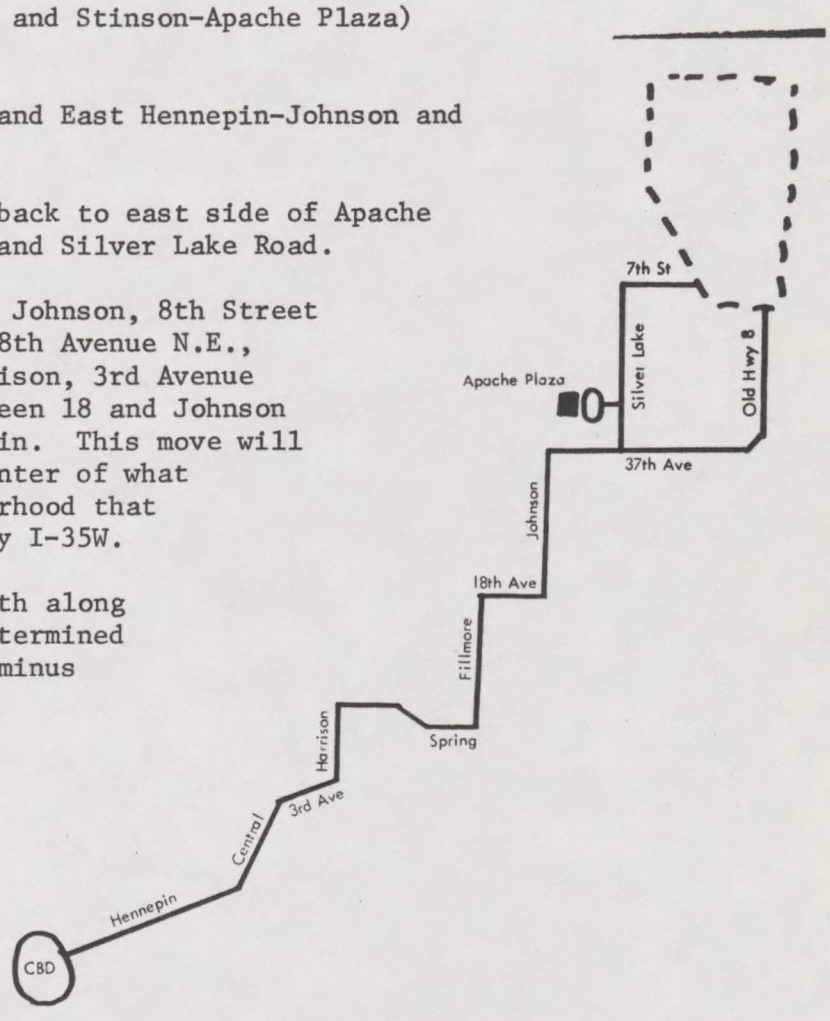
2) Cede 4A (8th and East Hennepin-Johnson and Hennepin) to route 1.

3) Extend 4A cutback to east side of Apache Plaza via 37th Avenue and Silver Lake Road.

4) Relocate from Johnson, 8th Street S.E. and Hennepin to 18th Avenue N.E., Fillmore, Spring, Harrison, 3rd Avenue N.E., and Central between 18 and Johnson and Central and Hennepin. This move will put the line in the center of what remains of the neighborhood that was partially removed by I-35W.

5A) Extend 4D north along Long Lake Road to undetermined terminus. Cede 4D terminus to extension of 4F.

B) Neighborhood is currently unserved between I-694 and County H2. Contemplate further extension north and east, possibly to Arden Hills Arsenal.




6) Extend 4F north into New Brighton via undetermined route.

No. 4 Bryant

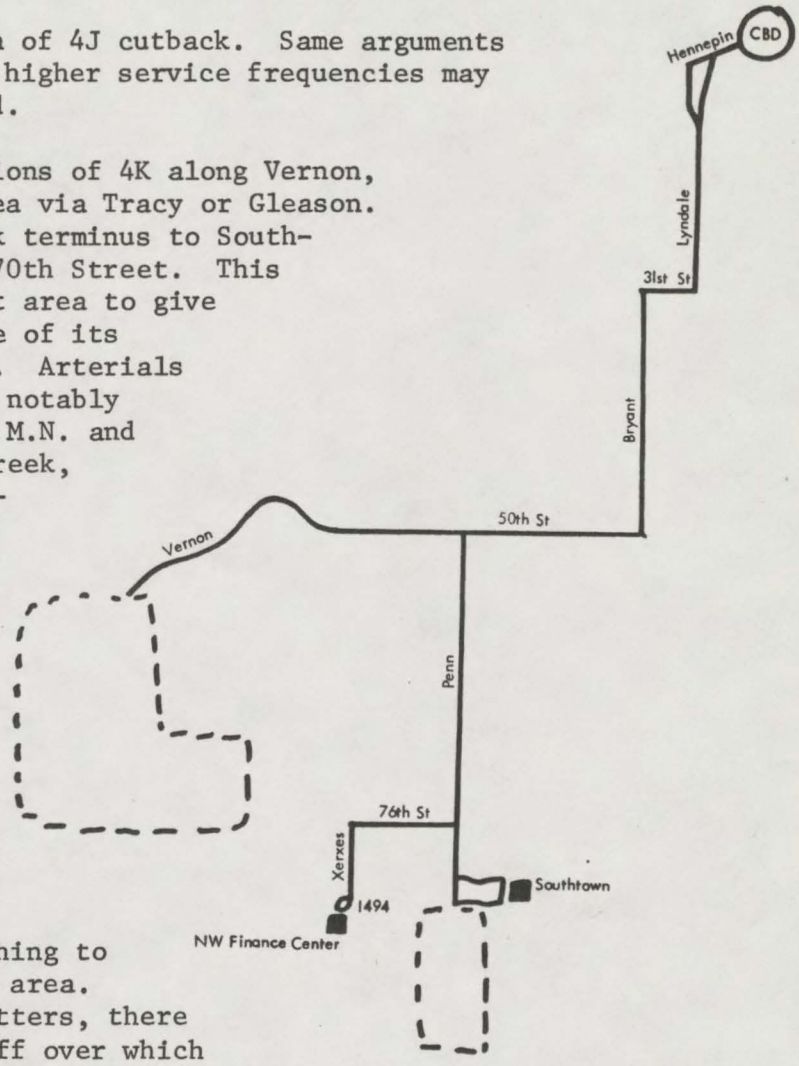
1) Eliminate 4C cutback. This is a typical city limits terminal that ignores the nearby shopping center at 66th Street, as well as the much larger Southtown-Target center at I-494. Should the cutback continue in some form, it should be moved to 66th Street where it would meet the #15 66th Street Crosstown. The exact same circumstance (cutbacks at 60th Street) exists on the following parallel lines - #5, #6 and #18.

Eliminate 4K cutback at Village Hall. This fails to recognize

recent growth beyond Highway 100 including shopping center and apartment complexes with higher population density than east of Highway 100.

Consider elimination of 4J cutback. Same arguments as for 4K, but resultant higher service frequencies may not be economically sound.

2) Consider extensions of 4K along Vernon, into Valley View Road area via Tracy or Gleason. Also possibly double back terminus to Southdale via 66th Street or 70th Street. This is an extremely difficult area to give complete coverage because of its physical characteristics. Arterials are cut off by barriers, notably Highway 100, Highway 62, M.N. and S. Railroad, Nine Mile Creek, and Lake Cornelia. Residential side streets are of the tangletown variety. Often, neighborhoods are isolated in pockets out of reach of the arterials. As a result, the only way to field continuous routes here is to allow much twisting and backtracking. Of course that will exact a penalty in overall travel time, an unwise thing to do in such a high-income area. To further complicate matters, there is the additional tradeoff over which center to orient the lines toward. Southdale should be well served, but doing so impedes access to downtown Minneapolis. The characteristics of the area also make it a candidate for the greater flexibility of Dial-a-Ride.




3) Extend undetermined distance along Penn. This is contingent upon purchase of or agreement with Bloomington Bus Company. Currently Bloomington Bus Company is serving this area with loops that cross Penn. Off-peak access involves a two-mile detour from their main Lyndale Avenue route. North-south service along Penn is desirable for the access it would give to Southtown Center, as well as removing the time-distance penalty currently placed on Bloomington's Main Line route.

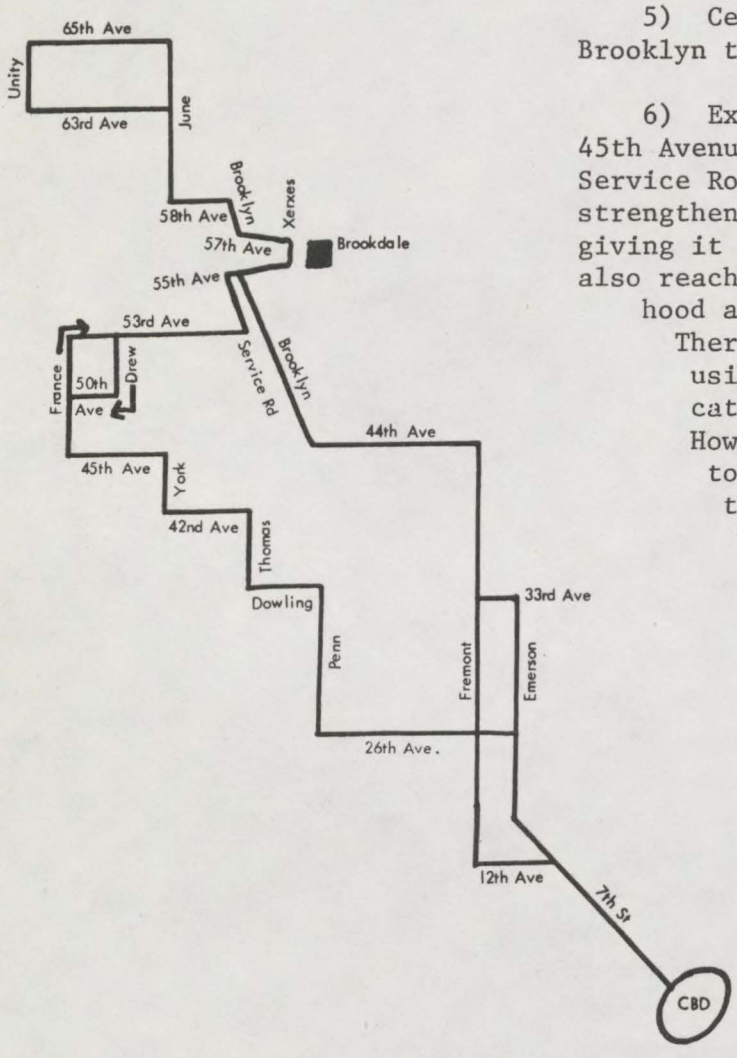
No. 5 Penn-Fremont

1) Eliminate 5A, 5G and 5B cutbacks. Neither 5A or 5G is ever used. It is pointless to continue to list them. 5B is another classic city limits cutback, falling just short of Brookdale.

2) Cede 5C (51st and Osseo-51st and Penn) to route 8.

3) Cede 5E (Brookdale-80th and Yates) to route 8.

4) Cede 5F (Brookdale - 62nd and Boone) to new north Crosstown.




5) Cede 5D (Brookdale - 65th and Brooklyn to route 8.

6) Extend 5H to Brookdale via York, 45th Avenue, France, 53rd Avenue, West Service Road and 55th Avenue. This will strengthen an already healthy route by giving it access to Brookdale. It will also reach a currently unserved neighborhood around 45th and Victory Drive. There is no way to reach Brookdale using city streets without duplicating the route of 14C and 14M. How this will affect #14 is open to question. We think the #5 will take over because more people will use it. The #14 may revert to a connecting stub at its old Ewing and Lake terminus, or the branch might conceivably given to #3, #11 or #19.

7) Abandon 5D (on 65 and 63 from Brooklyn to June). Relocate 5D from Brookdale to 65 and June via 58th and June. This will allow room for the new #8 branch to the 69th and Zane area, while simultaneously serving a new neighborhood along June.

No. 5 Chicago

1) Consider elimination of 5A or 5B cutback. We do not have the data to make an absolute judgement. It is probably safe to say that either 5A or 5B must be eliminated; they are too close together. However, we can see the need for one cutback to eliminate some of the eight-minute headway that is only feasible in higher density areas as exist along Chicago north of Minnehaha Creek.

2) Move 5C cutback to 66th and Portland. No center exists at 66th (there is a large American Legion Hall and a municipal swimming pool), but a connection may be made with #15 for Southdale and the Hub.

3) Cede 5G (57th and Chicago - 60th and 12th Avenue) to #14. Also 5H (66th and Bloomington to 86th & 12th Ave.), 5D (90th and 12th Avenue to 98th and 12th Avenue) to No. 14.

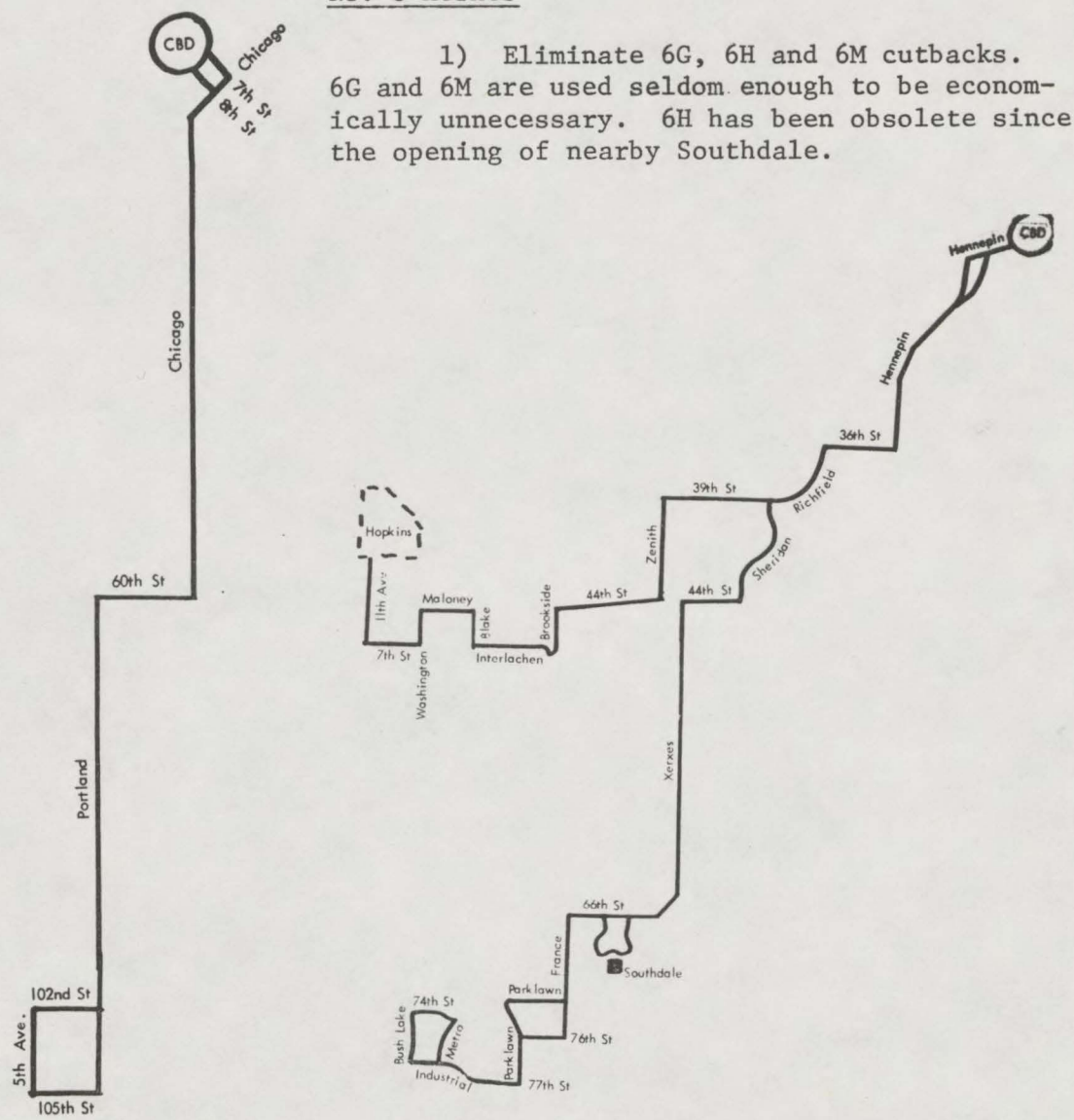
4) Extend 5D to 104th and Portland.

5) Abandon 5D on 90th and 98th Street.

Note to #6: This line currently has eleven southern terminals, including the "X" pullout point. It is necessary to divide the line in two to adequately simplify the service.

No. 6 Xerxes

1) Eliminate 6G, 6H and 6M cutbacks. 6G and 6M are used seldom enough to be economically unnecessary. 6H has been obsolete since the opening of nearby Southdale.



2) Reroute 6N from 39th and Sheridan to 44th and Zenith via 39th and Zenith. This will give better access to the neighborhood along Zenith, part of which is currently outside of the one-fourth mile coverage of #6.

3) Extend 6N to undetermined point in Hopkins via Brookside, Interlachen, Blake, Maloney, Washington, Seventh Street and 11th Avenue. This will serve an area, part of which is new and part of which had streetcar service into the early 1950's. Because of its characteristics of high income and low population density, ridership will doubtless be light.

4) Annex 12C from Excelsior Avenue to South Seventh Street.

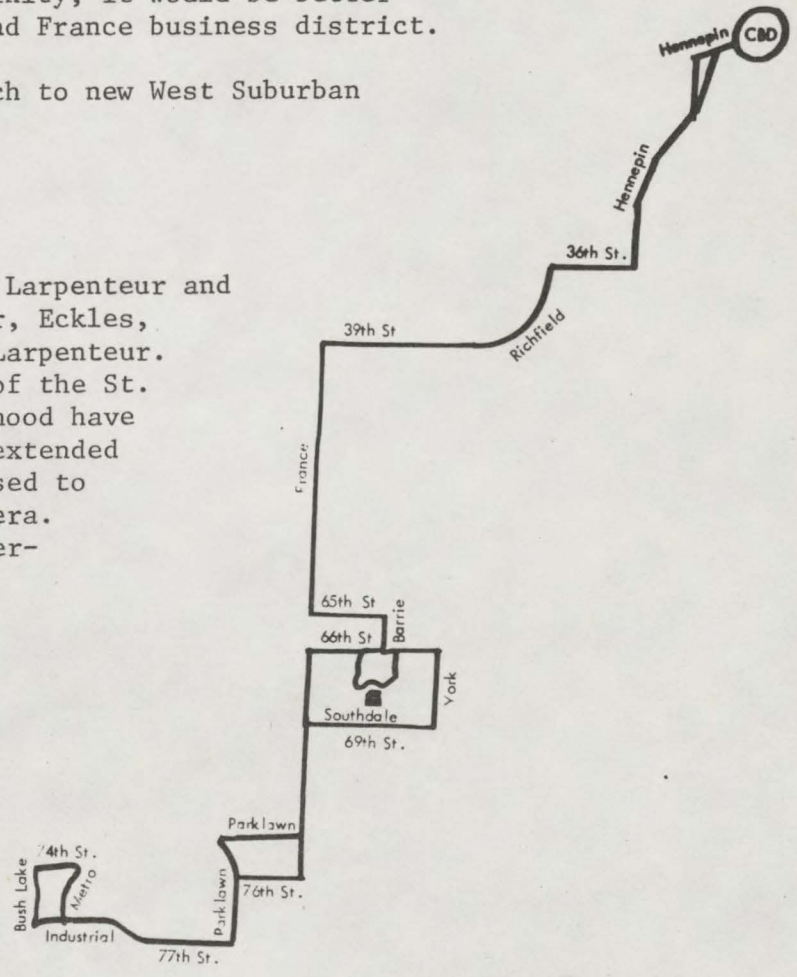
No. 6 France

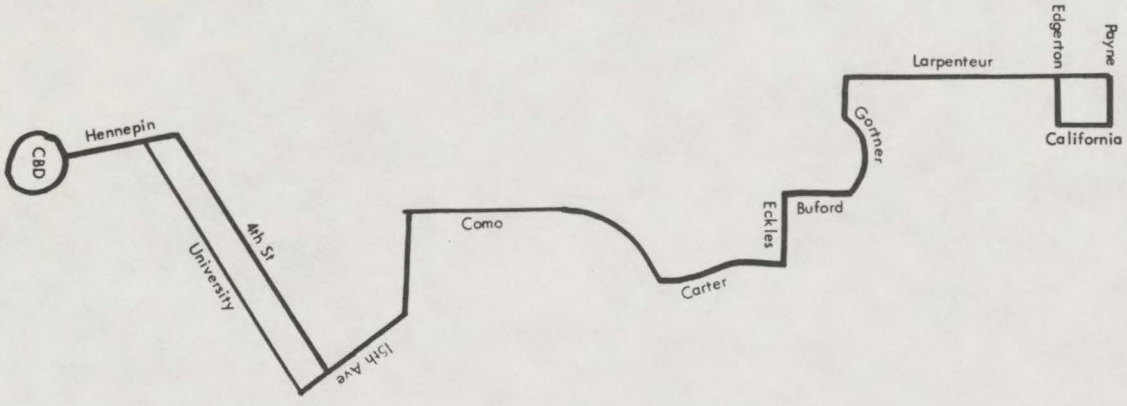
1) Eliminate 6A cutback. It exists only to mark the city limits. As with 6H, it ignores the presence of Southdale. Should a cutback be necessary in this vicinity, it would be better located at the 50th and France business district.

2) Cede 6B branch to new West Suburban Crosstown.

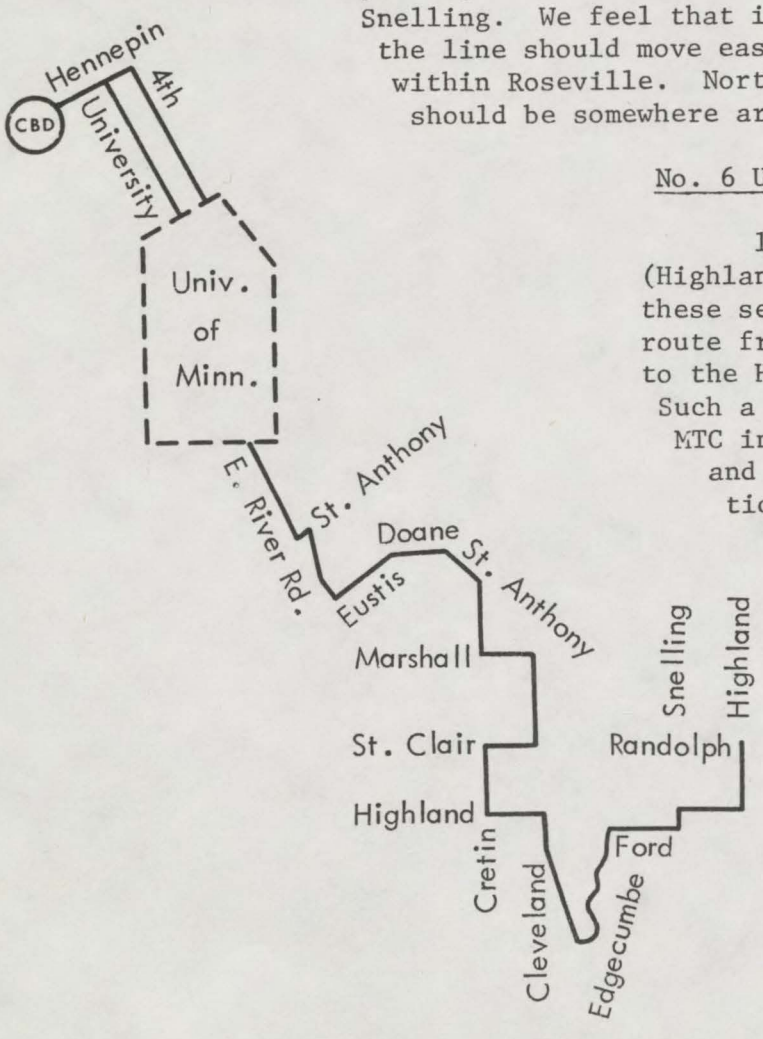
No 6 Como

1) Extend 6B to Larpenteur and Payne via Como, Carter, Eckles, Buford, Gortner and Larpenteur. For years, residents of the St. Anthony Park neighborhood have requested that #6 be extended to serve them as it used to during the streetcar era. Furthermore, the University of Minnesota, in its report describing the proposed status of the St. Paul campus in 1985, specified that #6 reach the campus. The crosstown portion of the route on Larpenteur may almost be treated as a separate entity. Its implementation depends to a large






extent on the development of north-south routes into Roseville on Dale and Lexington, as well as increased frequency of service on Edgerton, Jackson, Rice, Hamline and Snelling. Besides providing crosstown access, the line will serve the Minneapolis orientation of a great many people along its route. MTC recognizes this orientation to the point of putting the Minneapolis-St. Paul dividing line at Snelling. We feel that is a bit conservative, that the line should move eastward as one travels north within Roseville. North of Highway 36, the line should be somewhere around Lexington Avenue.




No. 6 University of Minnesota-Highland

1) Annex 8B, 8F, 21B, and 7B (Highland) branches. When joined, these segments form a continuous route from the University of Minnesota to the Highland Park area of St. Paul. Such a link was recommended to the MTC in the 1968 report by Simpson and Curtin. There is some question as to the best route from the Dinkytown business district to the intersection of Franklin and East River Road. There are four possible route combinations which require a choice among several plus and minus characteristics including: access to the center of the University campus, faster overall trip time, difficulty turning in the intersection of Oak

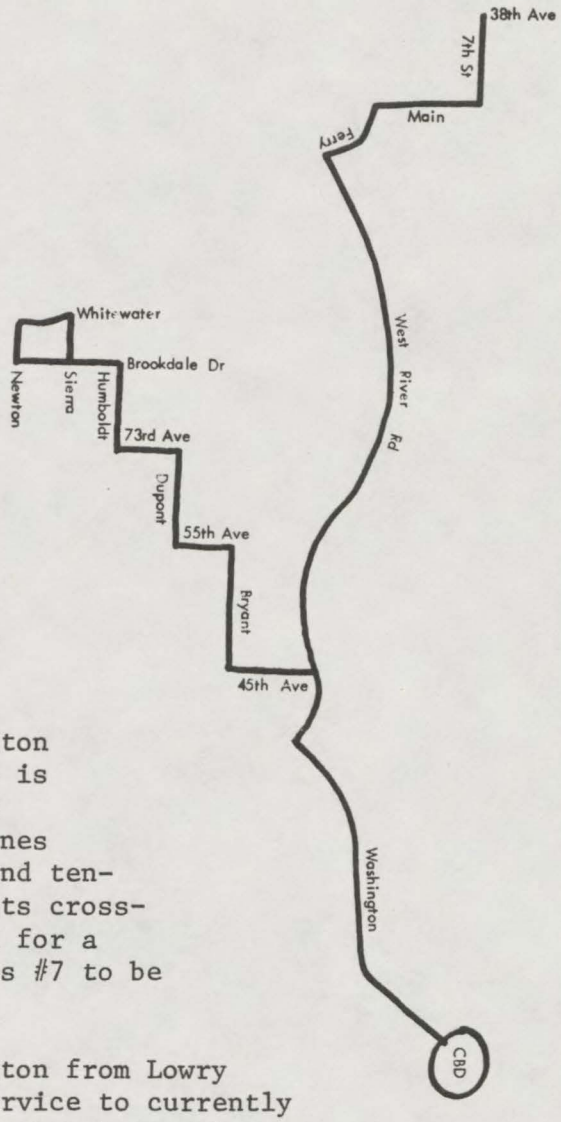
and Washington, railroad crossings on Washington and 27th Avenue, and very poor paving on East River Road.

No. 7 Minnehaha

1) Eliminate 7A cutback.

No. 7 North Washington Substitute for current No. 7

We ask the reader to hold tight, because this is a rather complex explanation. It involves four lines, #5, #7, #8 and #26. #26 is the former Dickenson West River Road bus. It is a recent acquisition which could have been integrated into the existing routes in a number of ways. The final combination arrived at by the MTC leaves something to be desired in terms of both simplicity and economy.




1) Cede 7B (Lowry and Washington - 36th and Washburn) to #11. There is currently little business along the Lowry portion of #7, yet the two lines share the street. Since we recommend ten-minute headway for #11 because of its cross-town status, that obviates the need for a separate CBD-oriented line and frees #7 to be extended north.

2) Extend #7 north on Washington from Lowry to 42nd Avenue. This will allow service to currently isolated employers along the river, though we acknowledge that residential traffic will be minimal because of home clearance to build I-94.

3) Annex 8B, 8C and 8D. Should the recent 8D extension prove sound, the 8C cutback should be eliminated.

The reason for taking over this #8 branch is to free the #8 to annex branches of #5, thereby eliminating much complexity and giving better access to at least one #5 branch.

4) Annex entirety of #26. This would merge all service past Mississippi Court Housing Project under one number. More importantly, it would reduce the number of route miles formerly run by #26 by about

three. There would be a slight penalty exacted in overall travel time, but it would be small; ridership on Washington north of Broadway is light and south of Broadway the street is shared with #14 and #20. During the rush hours expresses turning into downtown could be run, just as they currently are.

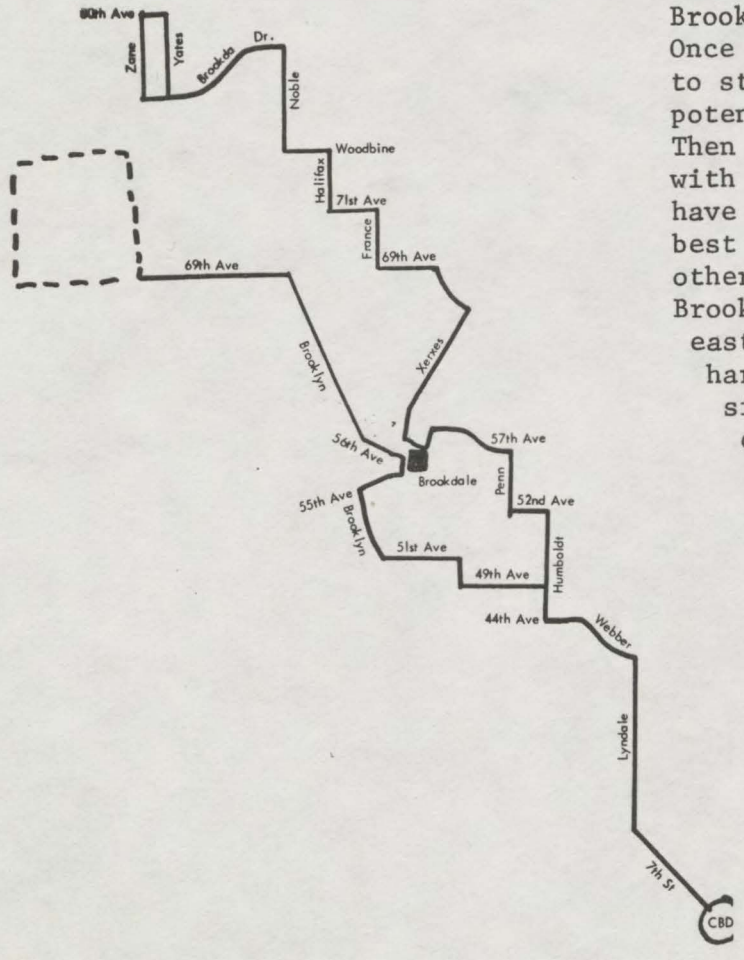
No. 8 North Lyndale

1) Cede 8B, 8C and 8D to #7.

2) Eliminate 8A cutback. It is used too seldom to matter.

3) Eliminate 8G cutback. This is another city limits cutback that exists for no other good reason.

4) Annex 5C (51st Avenue from Brooklyn to Penn). This branch is currently the best example of a route that goes to the trouble of backtracking to serve the CBD while ignoring a large suburban center, Brookdale, a bare half mile away. Fill in the gaps between 51st and Brooklyn and Brookdale, and from 51st and Penn to 49th and Humboldt. This will provide both Brookdale and CBD access, while relieving #5 of a confusing branch.




5) Extend 8G to Brookdale via 57th Avenue. Once again, it is pointless to stop that short of a good potential traffic source. Then combine 8G end to end with 5E. Some decision will have to be made about the best way to route this and all other through lines through Brookdale. Routes from the east via 57th Avenue will be hard put to reach the west side of the center, the current stop, without paying an undue penalty in elapsed time. A separate north side stop would be more in order. While speaking of this problem, we also would recommend either separate stops for inbound and outbound (from the CBD) buses, or indicator signs to that effect on the buses themselves. Currently all buses stop at the same spot regardless of direction, and passengers must individually ask the drivers about their direction of travel.

6) Annex 5D (Brookdale-65th and Brooklyn).

7) Reroute 5E from Xerxes and 65th to 69th and France via Xerxes, Shingle Creek and 69th Avenue.

8) Extend portion of ex-5D from 65th and Brooklyn to 69th and Brooklyn and west on 69th to undetermined terminus.

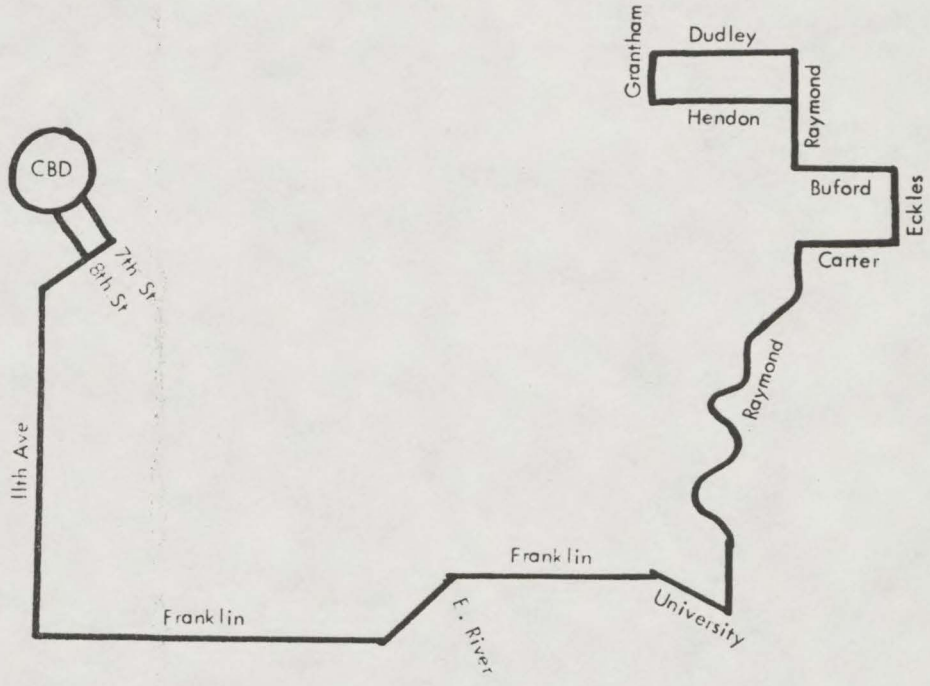
No. 8 Franklin

1) Abandon 8B branch or cede to No. 6.

2) Cede 8F to No. 6.

3) Move 8A cutback to Franklin and East River Road. Currently this cutback is unused, but it would be put to use given the changes listed here. It is a textbook example of a well-placed cutback; there is a steep drop in population density, a large physical barrier (the Mississippi) and a connection with another route.

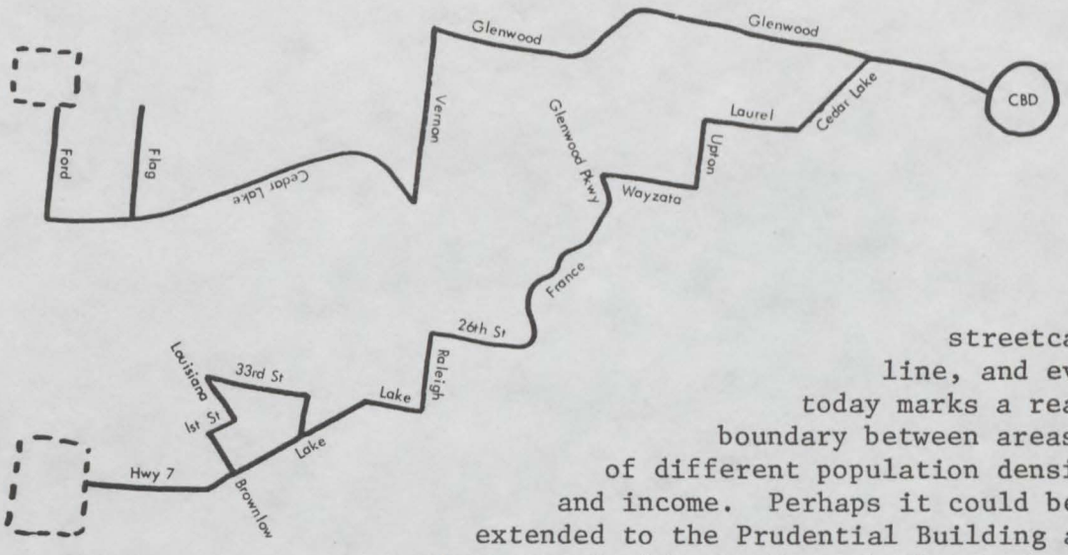
4) Extend 8C along Franklin and University to Raymond. Annex 16E (Raymond and University - Hendon and Grantham).




No. 9 Glenwood

1) Eliminate 9A cutback. This cutback is used too seldom to be necessary. Its function could easily be assumed by transferring the runs to the newly created #24 route.

2) Eliminate 9G cutback. Consider eliminating 9E cutback. 9G is another city-limits cutback at what would otherwise be a purely arbitrary point in the middle of this residential area. 9E on the other hand may have to be retained. At one time it was the terminus of the




streetcar line, and even today marks a real boundary between areas of different population density and income. Perhaps it could be extended to the Prudential Building and thus merged with the 9F cutback.

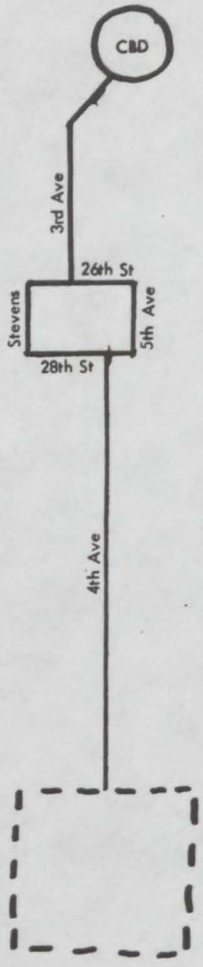
3) Extend 9H from 26th Street to Lake via Raleigh. Abandon 9H west of 26th and Raleigh. Annex 17D (Lake and Raleigh - Highway 7 and Texas). Eliminate 17D cutback. Annex 17E (Highway 7 and Texas - Lake and Van Buren). The whole Bryn Mawr line needs a suburban outlet. Thus the connecting extension to Lake. Once there, it seems only logical to simplify #17 by giving a branch to #9. This would also save Knollwood-bound riders on #9 a transfer. That done, the 17D cutback can be eliminated because of the higher densities along the E part of the route.

4) Extend 9C on Cedar Lake Road to Ford, on Ford to undetermined terminus. Create 9D on Flag from Cedar-Lake to 18th Street. These two branches will serve newer neighborhoods that have no east-west access. They are cut off by Highway 18. The only feasible route requires backtracking from Cedar Lake Road.

No. 9 Fourth Avenue

1) Eliminate 9A cutback. This cutback is currently never used.

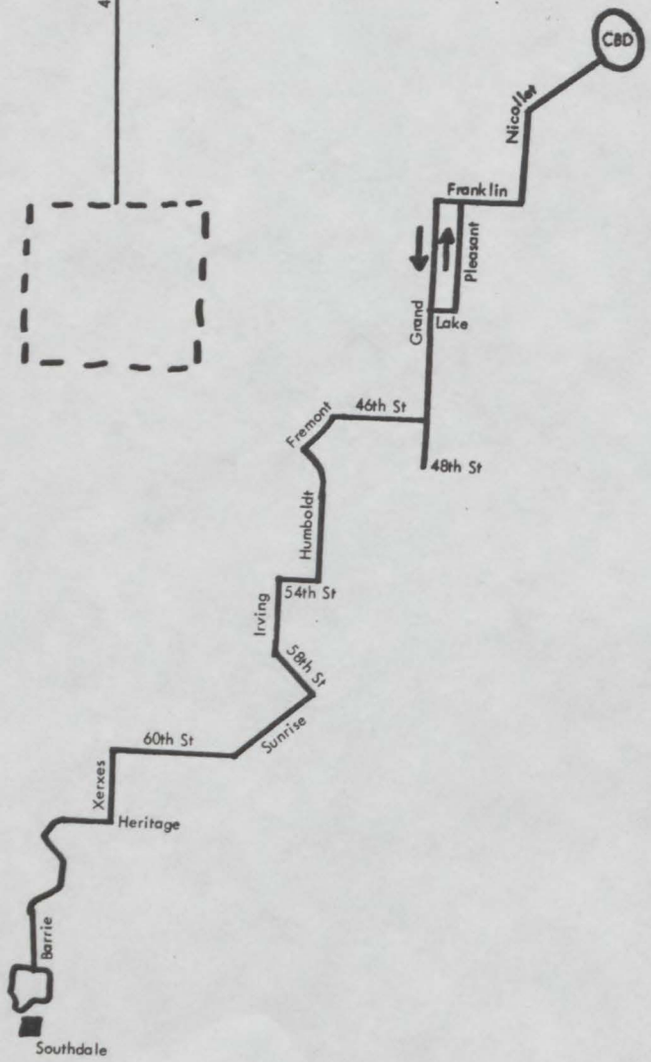
2) The #9 needs an outlet to Richfield and Bloomington. It is particularly important for a low-income Black neighborhood to have access to the growing suburban employment areas and discount shopping facilities. This may be accomplished by tying into either #18 Nicollet or #5 Chicago and transferring passengers, or #9 might be extended all the way out of the city on its own, given the existence of certain factors. In the case of #9, the answer is not very clear. Fourth Avenue ends at the barrier of Minnehaha Creek and Diamond Lake, so a simple extension is not possible in that direction. However, by running across 50th Street to Nicollet, an end-to-end connection could be made with the #18G branch, the terminus of which could easily be extended to the Southdale area. The only thing standing in the way of




merging #9 and #18G is the steep hill on 50th Street as it crosses I-35W. It would have to be carefully maintained in the winter to remain passable. If determined to be unuseable, the only remaining options are: east to Chicago and a connection with #5, or south to Diamond Lake Road via Portland and Clinton. The latter neighborhood, isolated from bus service with the opening of I-35W, nonetheless would require street repaving and possibly parking regulations on Clinton Avenue.

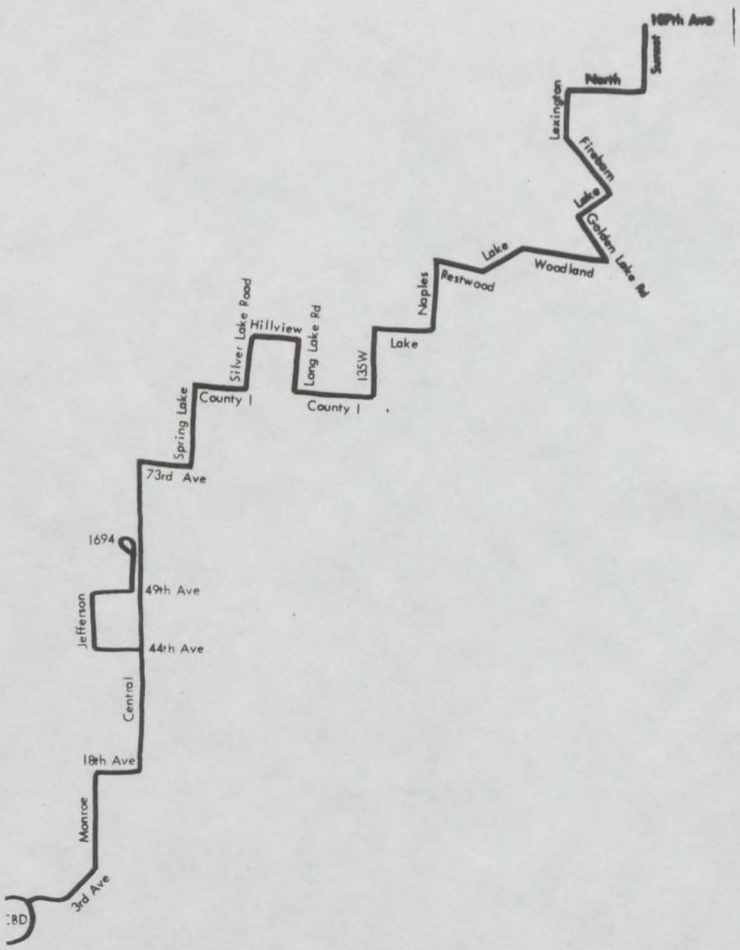
No. 10 Grand

1) The situation of #10 is almost the same as that for #9 described above. Both stub-end at 48th Street, two blocks short of the geographical barrier that terminates the street. Together they bracket #18 Nicollet and are both capable of annexing part of the 18G branch and then participating in its extension to Southdale. Should #10 take this option, it would work its way via secondary streets to the furthest point on the 18G at Irving. #18 would still operate the branch, but over a different alignment terminating at 66th and Lyndale.




Extending #10 in this way would bring service to the neighborhood just south of Minnehaha Creek, currently isolated because of the path of the creek. The remainder of the extension would be somewhat redundant, though it would eliminate the transfer currently needed to reach Southdale from the 60th and Penn area. The portion on Heritage Drive would provide better access to that vast apartment complex, following the leads of rush hour expresses 35J and 35K.

Should #9 handle the 18G, #10 would content itself with a short extension to the nearby #4 Bryant.




No. 10 Central

1) Change 10A cutback to 10X. Nothing but pull-ins and pull-outs terminate at Lowry anyway.

2) Eliminate 10B cutback. This is a city limits cutback that no buses currently use.

3) Cede 10D, 10E, 10F, 10G and 10K to #18. The only reason all these University Avenue buses backtrack to Central is that the streetcar line up Central used to terminate at 40th and Fifth Street. It did so because that was the only settled portion of Columbia Heights at that time. Subsequent bus extensions perpetuated the pattern, despite the penalty it exacts in running time. MTC has come to grips with this somewhat by running some University Avenue expresses during the peaks.

4) Having thus truncated #10 at the 10C cutback, a change in the 40th - 44th Avenue loop is in order. #18D will continue to provide cross-service on 40th Avenue, and the proposed Brookdale-Apache crosstown may travel 44th or 49th Avenue. Loops of such size are always to be avoided unless no other means of routing exists. Nonetheless, it seems necessary to have a cutback point for half the runs somewhere in Columbia Heights. (The remainder will travel the annexed #28 - see below.) There are a couple of "backwater" neighborhoods within the Heights that could use service from #10. They include 37th Avenue between Central and Fifth Street, the length of Jefferson Street, and the three east-west hill neighborhoods along 46th and 49th Avenues. The Brookdale-Apache crosstown can serve some of these, depending on how it is deployed.

After playing with any number of combinations, we have decided on the following for #10. Route all buses via Central, 44th, Jefferson, 49th and Central. Establish a cutback at one of the big store parking lots just south of I-694.

5) Annex route 28 in its entirety. Run all 28's as 10B and 10C, completely via Central (no jog over to Jefferson).

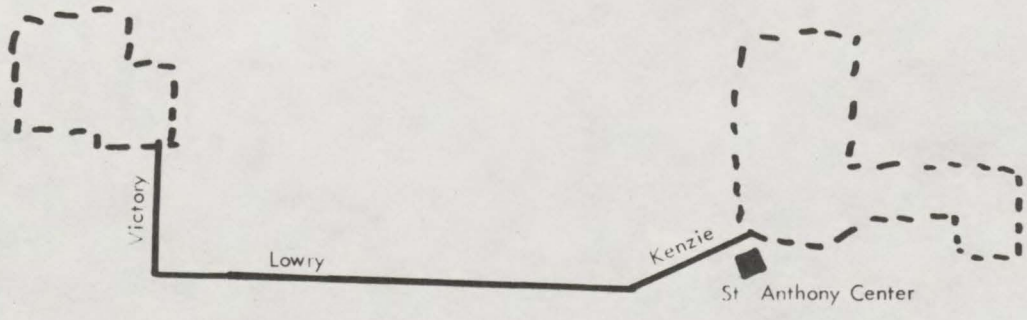
6) Relocate to 18th Avenue and Monroe from Central. This will coordinate with parallel relocations of routes 1, 4 and 18 to compensate for the construction of I-35W and simultaneously provide better access for the neighborhood centering on Fifth and NE Washington.

No. 11 Lowry

1) As stated earlier, there is no need for two routes on North Lowry. With the ten-minute headway it will receive as a crosstown, #11 can more than effectively take over the functions of #7. The extension to 36th and Washburn may either be run on the present route or via Victory Drive, depending on how close MTC wants #11 to come to North Memorial Hospital. An immediate extension seems in order as far as 36th or Dowling and York. After that, any further extensions would depend on what terminus has the greatest load potential, Robbinsdale or Brookdale.

2) Consider extension northward into St. Anthony Village to undetermined point. A likely route would reach Apache via Silver Lake. 33rd Avenue, Skycroft or Highcrest and 37th Avenue. This assumes the elimination of the current 1B loop in St. Anthony.

3) Extend rush hour service to Rosedale via Kenzie, Highway 8, County C, Cleveland and County B2.

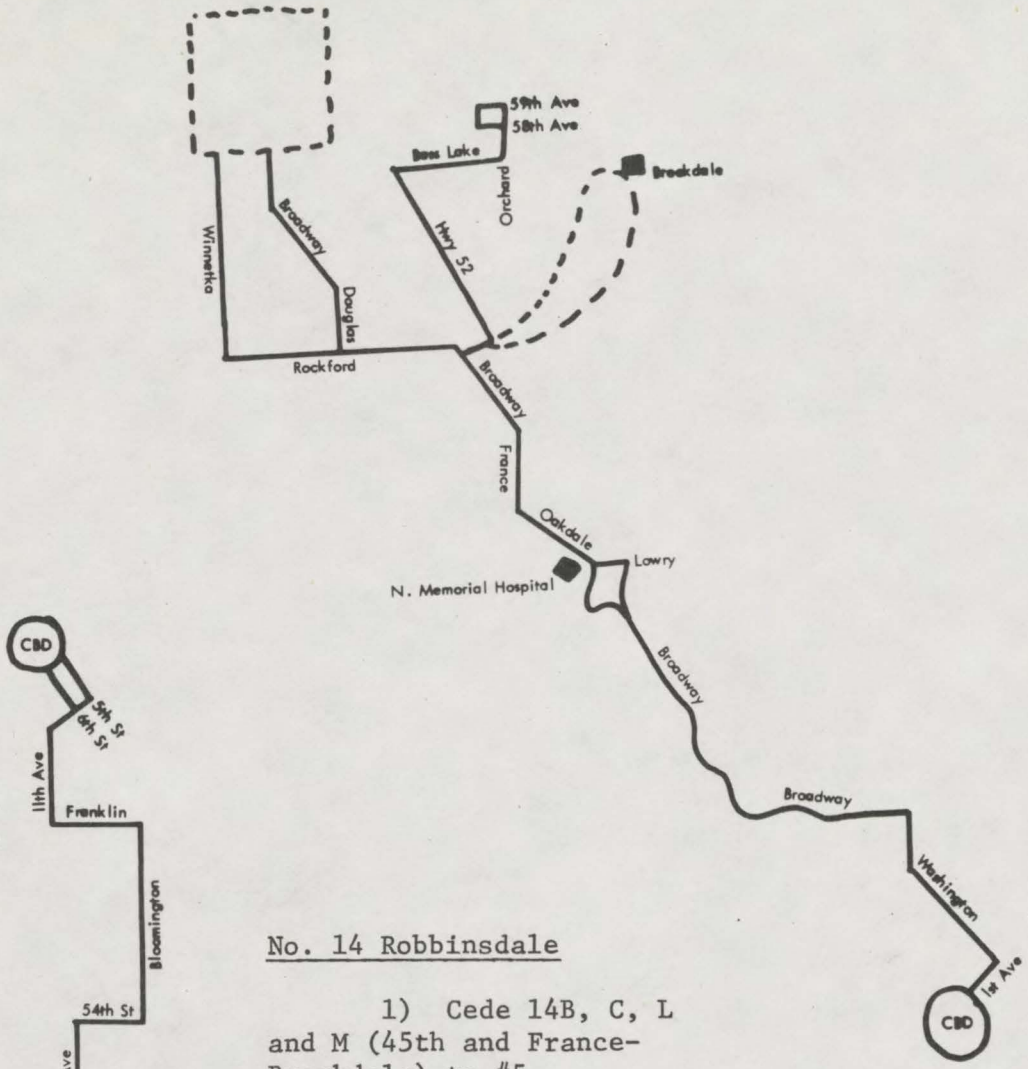



No. 12 Hopkins

1) Eliminate 12A cutback. Extend all 12A's via 12B loop.

2) Cede 12C (17th Avenue, County 3, 11th Avenue) to #6 (Xerxes-Como).

3) Consider ceding northern portion of 12B Elmo Park loop to extension of current 17E.




No. 14 Robbinsdale

1) Cede 14B, C, L and M (45th and France-Brookdale) to #5.

2) Cede Yates loop to #19. The Yates loop is the most confusing part of #14. It connects with #19 at 36th and Noble.

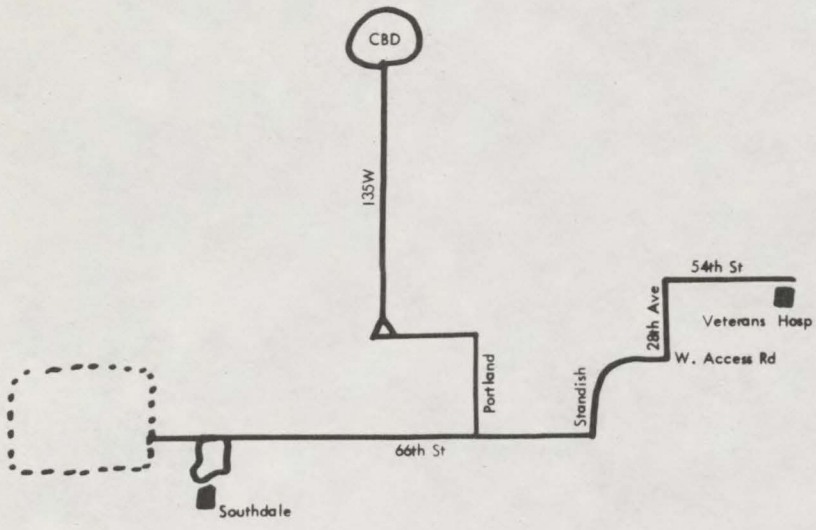
3) Consider extension of 14D or B to Osseo and North Hennepin Junior College via undetermined streets.

4) Consider all-day service on 14J.

No. 14 Bloomington

1) Annex 5G (57th and 12th Avenue - 60th and 12th Avenue) via 12th Avenue and 60th Street. Abandon ex-5G on 61st Street, 57th Street and 15th Avenue. Extend 14A to fill gaps, (54th and Bloomington to 57th and 12th Avenue to 66th and Bloomington via 60th and Bloomington.) Annex 5H from 66th and Bloomington to 86th and 12th Avenue via Bloomington,

76th Street, and 12th Avenue. Abandon ex-5H on 66th Street, 84th and 86th Avenue. Extend ex-5H on 12th Avenue to 98th Street. Consider extension across Minnesota River on Highway 36. This is a convenient way to give a suburban outlet to #14, eliminate two branches of #5, as well as the large 5D loop. It will also bring service to the neighborhood along Bloomington south of Highway 62.

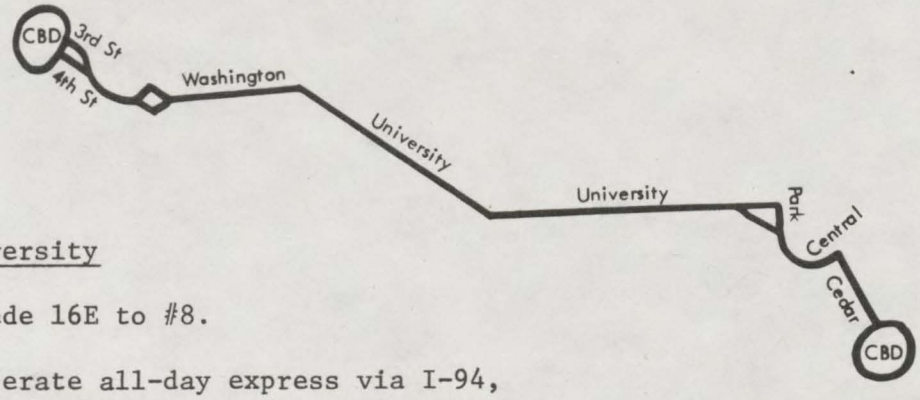



No. 15 - 66th Street

1) Extend eastern terminus to Veterans Hospital via 66th, Standish, 62nd, 28th, and 54th. This will provide a suburban outlet for #7, #19 and #22. Whether the extension should terminate at 42nd Avenue or the Veteran's Hospital (48th Avenue) depends on the load generating abilities of the hospital.

2) Extend perhaps more than one branch into Valley View Road, Lake Cornelia neighborhoods west of Southdale or consider large loop.

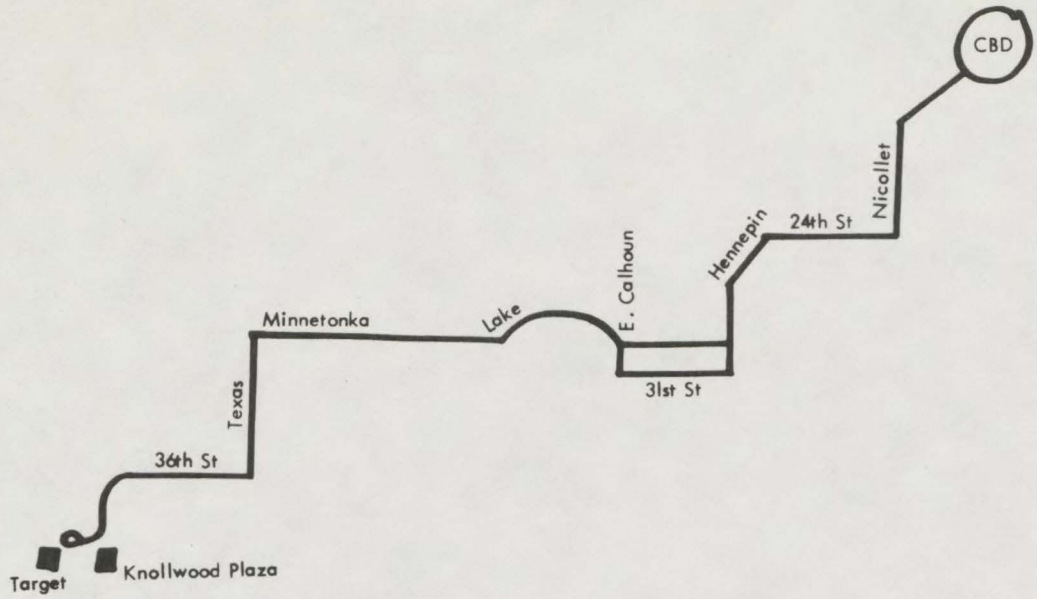
3) Extend branch to downtown during off-peak as express via Portland, 60th and I-35W. This is a compromise means of giving CBD-oriented off-peak express service to #4, #18 and #5. Based on the experience of Bloomington Bus Company, we feel a demand exists for such a service.




No. 16 University

1) Cede 16E to #8.

2) Operate all-day express via I-94, Fulton, Oak, Washington, and same downtown stops. Stops at all downtown stops, Dale, Snelling, Coffman Union, and West Bank.

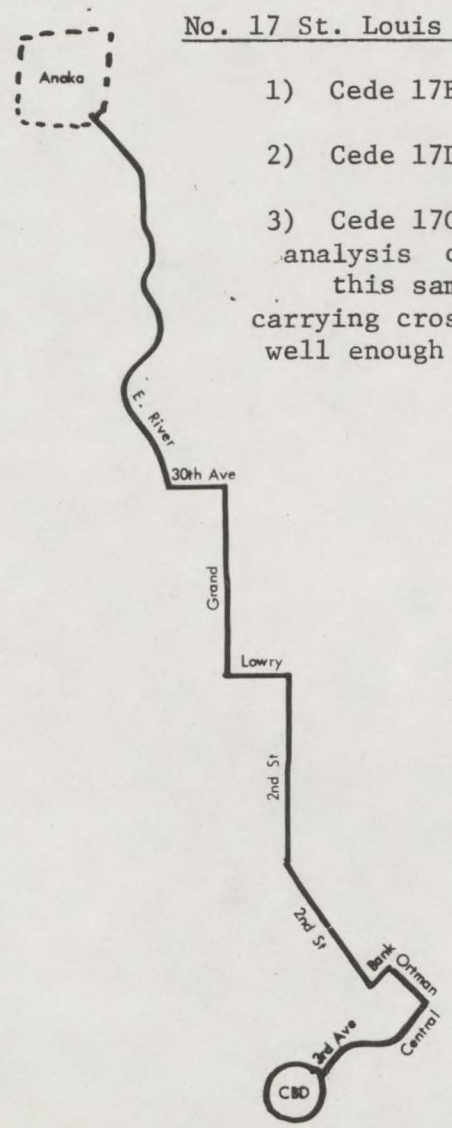



No. 17 St. Louis Park

1) Cede 17B to #1.

2) Cede 17D and 17E to #9.

3) Cede 17G to new crosstown route. The transit self analysis conducted by the city of St. Louis Park makes this same suggestion. There is more business in carrying crosstown than CBD passengers. CBD access is well enough provided by #17 and #12.

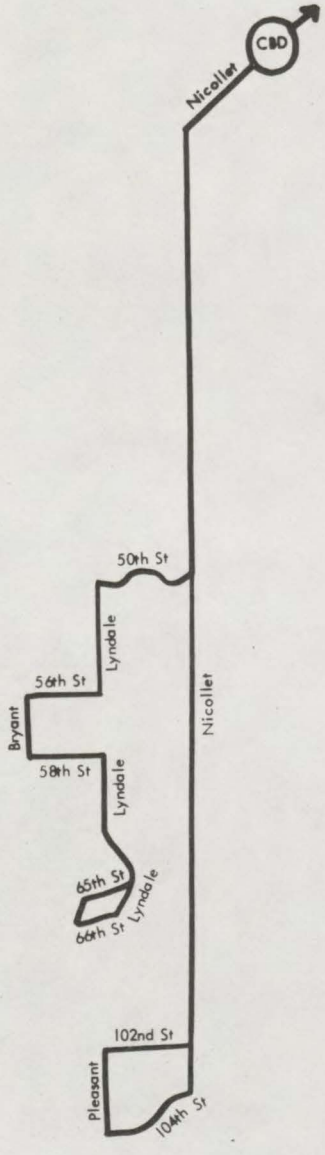



No. 17 Anoka-NE Second Street (formerly 18A and 18B Second Street)

This line is a complete annexation of 18A and 18B. The disruption to the line's patrons will be minimal, since both #17 and #18 travel the same route from 24th and Nicollet through downtown. Relieving #18 of this branch will enable it to take on another, as indicated below. With the takeover, service will cease between 30th and Grand and Main and St. Anthony. This was always a slow, unproductive portion of the route, consisting of four sharp turns, several railroad crossings, and some horrendous potholes on the bridge over the railroad tracks. It generated no business at all.

North of 30th and Grand, #17 will annex the entirety of #27, the recently acquired East River Road route of

Dickenson Lines. Unless business is enough to justify expresses, we feel the off-peak runs should follow the local route via Grand and Second Street. There will be a slight penalty in travel time, but the MTC will save about eight route miles per round trip, as well as continuing to provide a suburban outlet for the line. Since taking over the East River route, the MTC has put out a well-placed experimental branch that allows shopping access to Northtown from Anoka. With a little judicious schedule manipulation, these runs could collect passengers from southerly points on the line.




No. 18 Nicollet

1) Cede 18G totally or in part to either #9 or #10. If #9, extend new branch to 66th and Lyndale via 58th and Lyndale. If #10, extend to 66th and Lyndale via 50th Street, Lyndale, 56th, Bryant, 58th and Lyndale.

2) Eliminate 18B cutback. Use 18C instead. Thus another city limits cutback is replaced by one at a shopping center and crosstown junction.

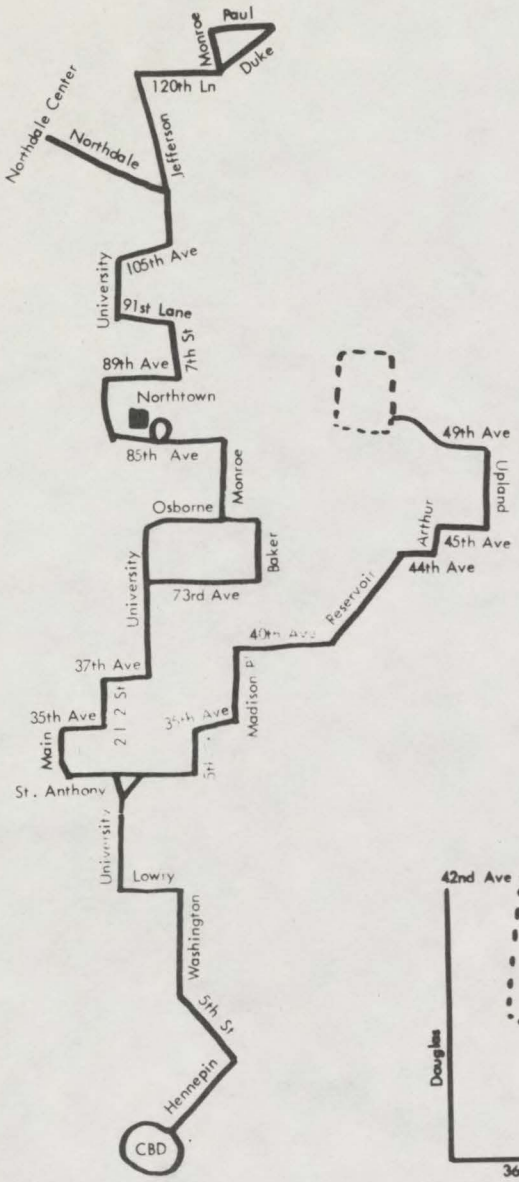
No. 18 University NE (formerly 18G Monroe)

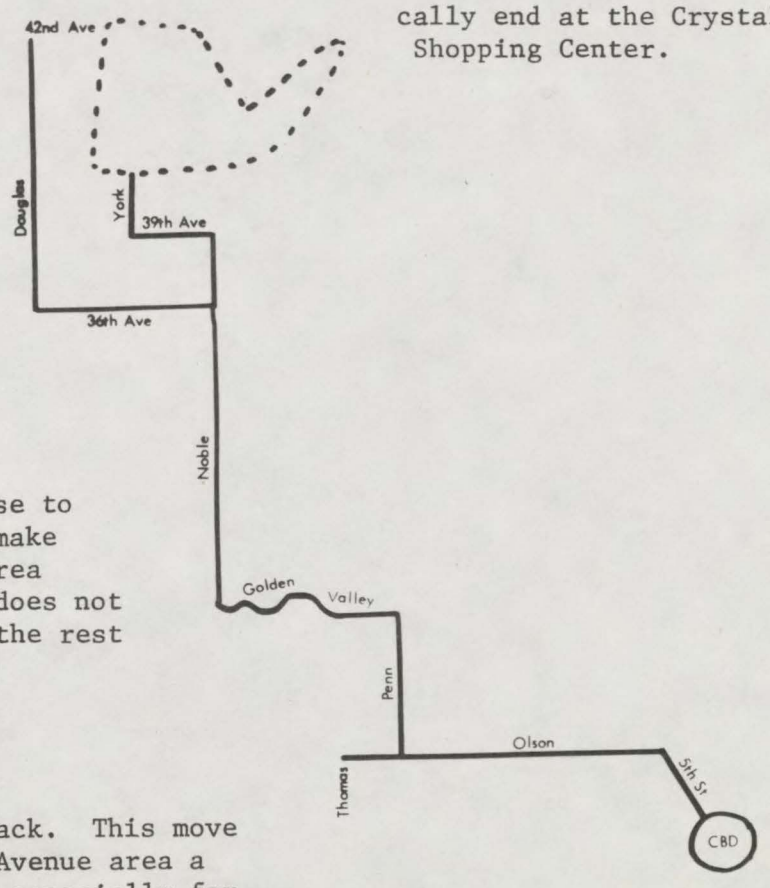
1) Relocate from Monroe and Broadway to Fifth Street and Washington. #10 will take over the Monroe portion. New routes will serve a low income, high percentage elderly neighborhood better than old route.

2) Annex 18C from Main and St. Anthony to 40th and Central. Bridge gap to annex via Lowry, University and St. Anthony. Abandon on Washington Street from Lowry to 27th Avenue.

3) Annex 18D from 40th and University to Upland and 49th. Abandon on 40th from University to Jefferson. Bridge gap from University and St. Anthony to 40th and Jefferson via St. Anthony, Fifth Street, 35th Avenue, Madison Place and Jefferson. Extend 18D west on 49th and I-694.

4) Annex 10D, 10E, 10F, 10G and 10K. Consider elimination of 10D cutback or relocation. This annexation will merge all University Avenue corridor lines into one, with a saving in travel time. It will also give a suburban outlet to current 18G.




No. 19 Olson

1) Cede 19D to #20. This will simplify the line somewhat and would allow more frequent headways along Noble.

2) Annex the Yates loop of #14. The connection point at 36th and Noble is ready to use, given the abandonment of the portion of #14 on 36th from Noble to France. The center of this half-mile stretch has no houses because of the school and railroad track, so the line will not be sorely missed. The ultimate terminus of the annex is debatable. It could stop in downtown Robbinsdale, continue along Lake Drive via the current 14M route, stopping at Lake and France or continuing to Brookdale. It could continue into the neighborhood north of 42nd and Yates, an area currently unserved except for partial peak-hour coverage by 14J. Such an extension could logically end at the Crystal Shopping Center.

No. 19 - 28th Avenue

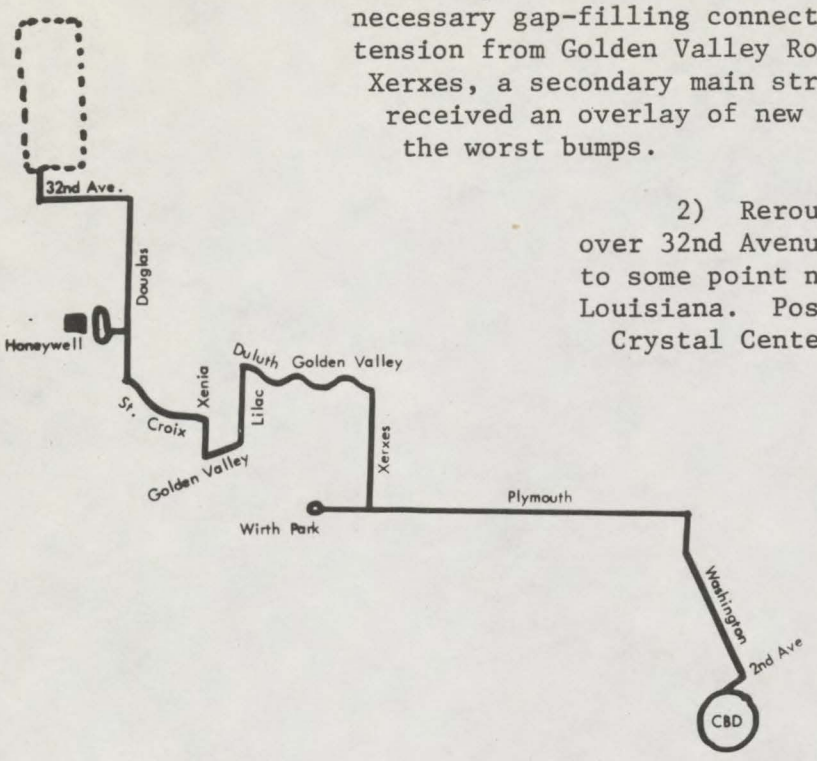
1) Eliminate 19A cutback. It is too close to the end of the line to make much difference. The area around the 19B cutback does not differ noticeably from the rest of the line.

No. 20 Plymouth

1) Annex 19D cutback. This move will give the Plymouth Avenue area a direct suburban outlet, especially for

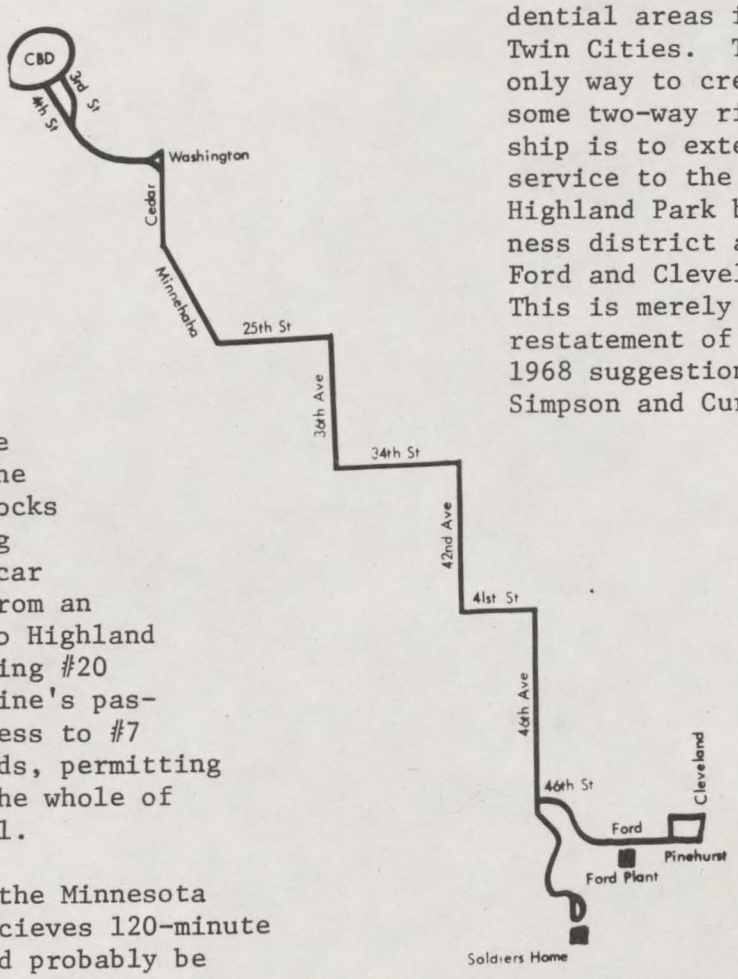
work trips to Golden Valley Honeywell. The necessary gap-filling connection would be an extension from Golden Valley Road to Plymouth via Xerxes, a secondary main street that has recently received an overlay of new asphalt to remove the the worst bumps.

2) Reroute from Douglas north over 32nd Avenue to Louisiana. Extend to some point north of 32nd via Louisiana. Possibly continue to Crystal Center.




No. 20 East 20th Street

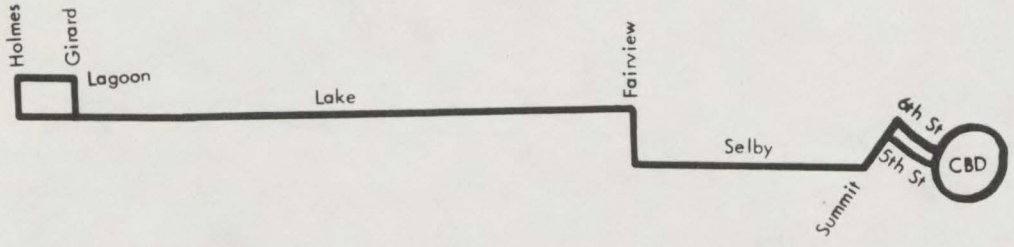
1) Eliminate 20A cutback. No one rides against the flow of CBD-oriented business to reach 46th Street and 46th Avenue. #20 passes through one of the most totally residential areas in the Twin Cities. The only way to create some two-way ridership is to extend service to the Highland Park business district at Ford and Cleveland. This is merely a restatement of a 1968 suggestion by Simpson and Curtin.

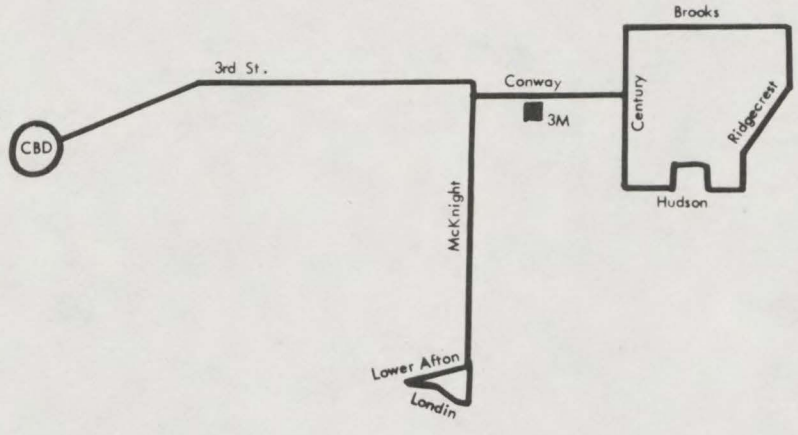



Today buses cross the bridge but stop at the Ford Plant, three blocks short of the shopping area, another streetcar tradition stemming from an era when there was no Highland Park Center. Extending #20 will also give the line's passengers transfer access to #7 and #9, in other words, permitting complete access to the whole of southwestern St. Paul.

2) Currently, the Minnesota Old Soldiers Home recieves 120-minute headway. This should probably be reduced to 60 minutes. In any case,

all Soldiers Home trips (20C) should double back and across the river to Highland Park. This is currently done on some late evening trips in an attempt to serve both branches with one bus. Should the practice be extended to every run, it would give the Home residents a needed outlet to St. Paul, as well as providing an assurance to Highland-bound passengers that they can use any bus on the line.




No. 21 Selby-Lake, East Third Street

1) Cede 21B to No. 6.

2) Annex 3A, 3B,and 3C east of downtown. Currently #3 is just too complex. #21 runs on the same downtown streets. Since it currently does not extend out to the east side of St. Paul, it is the logical choice to take over half of #3's current clutter. The choice of the Third Street rather than the Maria route is purely arbitrary. It would work as well the other way round.

3) Consider elimination or extension of 3A cutback. McKnight Road certainly signals a sharp drop-off in residential development, ordinarily a good reason for a cutback. The question to answer is whether or not the two branches of the route deserve headways frequent enough to use every bus that leaves downtown. If so, eliminate the cutback. If not, the terminal would be better placed about three blocks down McKnight Road at the Sunray Shopping Center.

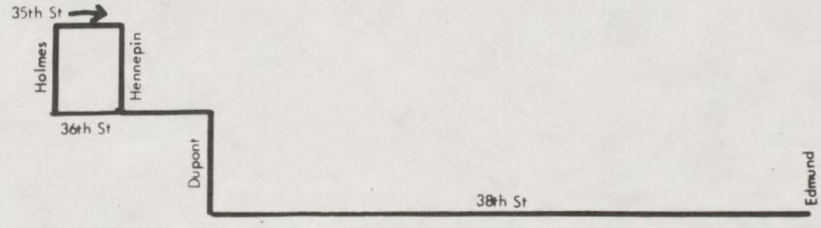
No. 22 - 34th Avenue South

1) Eliminate 22A cutback. This situation is almost identical to that of nearby #19 described earlier. MTC within the past year has in fact increased 22B service from peak-hour only to all-day.

2) Extend to 58th and 46th Avenue via 43rd Avenue and 58th Street. This is a three-square-block residential area that was abruptly isolated by the building of Highway 62. Whether it would support the modest extra cost of extension is open to question.

No. 23 - 38th Street

1) Extend to 36th and Hennepin via 38th, Dupont and 36th. This short extension will allow transfers to the myriad branches of #6. The route via Dupont was chosen because of the larger intersection (easier to make the turn) at 36th Street. Should examination find the 36th and Bryant intersection adequate, we would prefer it, for its closer proximity to a larger population.




No. 51 Mound

1) Explore extensions along Tuxedo Road in Spring Park.

ST. PAUL

No. 3 Maria

1 1) Cede #3A, #3B, #3C to #21.

2) Consider elimination of 3D cutback. This situation is similar to the question of 3A discussed earlier. If enough business exists on the branches beyond the cutback to make use of all the buses leaving downtown, then the cutback is unneeded. If it is eliminated, the portion of its loop on White Bear Avenue is no longer needed.

3) Abandon 3E from Burns to Upper Afton on McKnight. Extend 3D on Burns to Ruth. Eliminate loop on Ruth, Suburban and Peterson. Extend 3E on Ruth to Sunray Center, RH to 3M complex. The current

No. 5 Stryker

1) Consider eliminating 5B cutback. This depends on the amount of business that exists on the 5C and 5F branches.

No. 6 Dale

1) Extend north to undetermined point in Roseville. How far into Roseville is a good question. Population is a bit sparce along Dale because of the St. Paul Water Works Reserve, Woodview Detention Home, Parkview Junior High, Concordia Academy, and Roseville Central Park, all of which create large holes in the residential growth pattern. It is probably safe to run the line up to County B or B2, to a connection to Rosedale and Har Mar. This, however, invades the service territory of Rice-Edgerton Lines, which the MTC has promised to avoid doing.


No. 7 Thomas

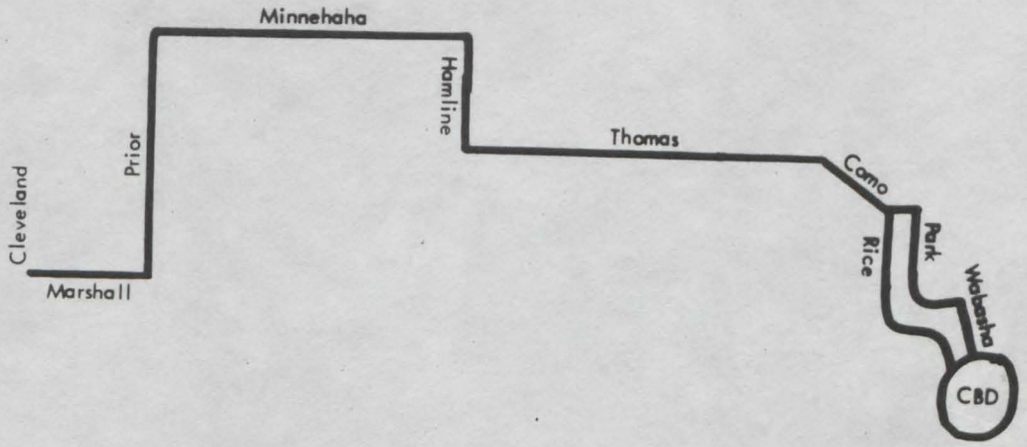
1) Cede 7B to # 6 south of Marshall.

2) Relocate from Cleveland and Marshall to Prior and St. Anthony via Prior and Marshall. This will save one turn and space the route more evenly.

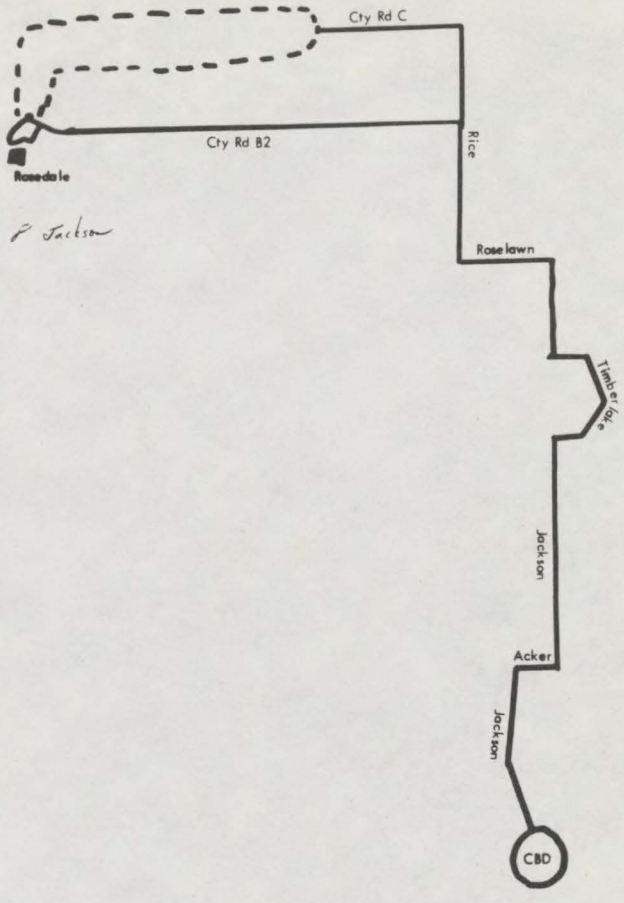
No. 8 Jackson

1) Eliminate 8B cutback.

2) Extend 8C via Roselawn, Rice, County B2 to

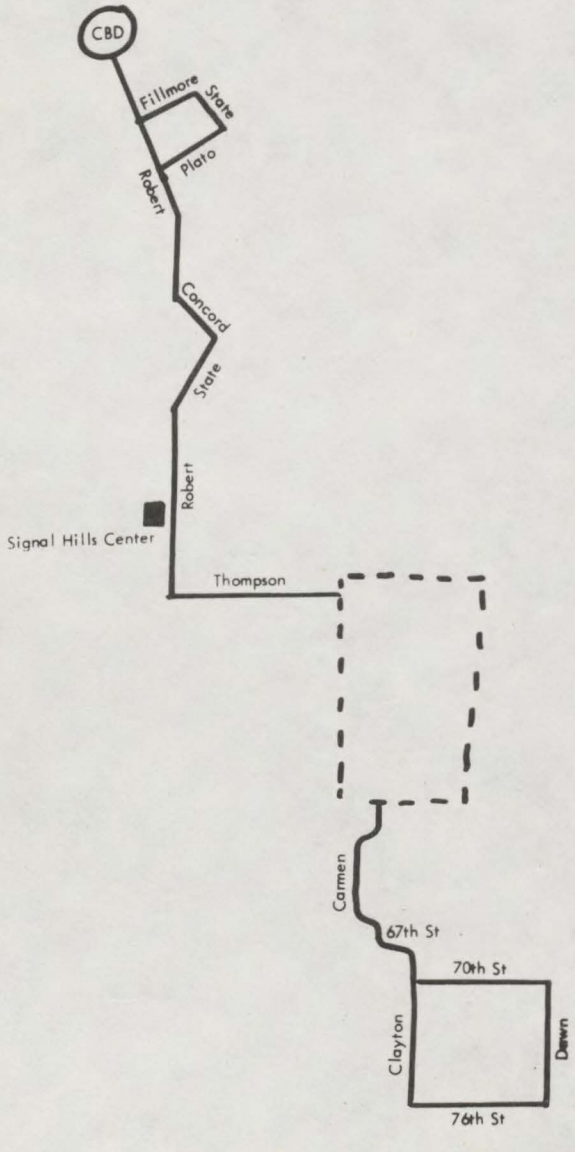


Rosedale. Besides creating an outlet to Rosedale for St. Paul residents, this routing is also the only realistic way to serve the portion of Roseville within one mile of Highway 36. These neighborhoods have an east-west grain to them, largely because of the similar ridge-swamp pattern of the land.




No. 8 Robert

1) Consider eliminating the 8B cutback. 8B is a well-placed cutback, but the South St. Paul-Inver Grove Heights portion of the line may be well enough developed to support half-hourly headway.




2) Eliminate 8A cutback. It is never used.

Northeast St. Paul Corridor

Including Maplewood, North St. Paul, White Bear, Vadnais Heights, Little Canada, Bald Eagle, Mahtomedi, Oakdale, Lake Elmo, Stillwater, Bayport.

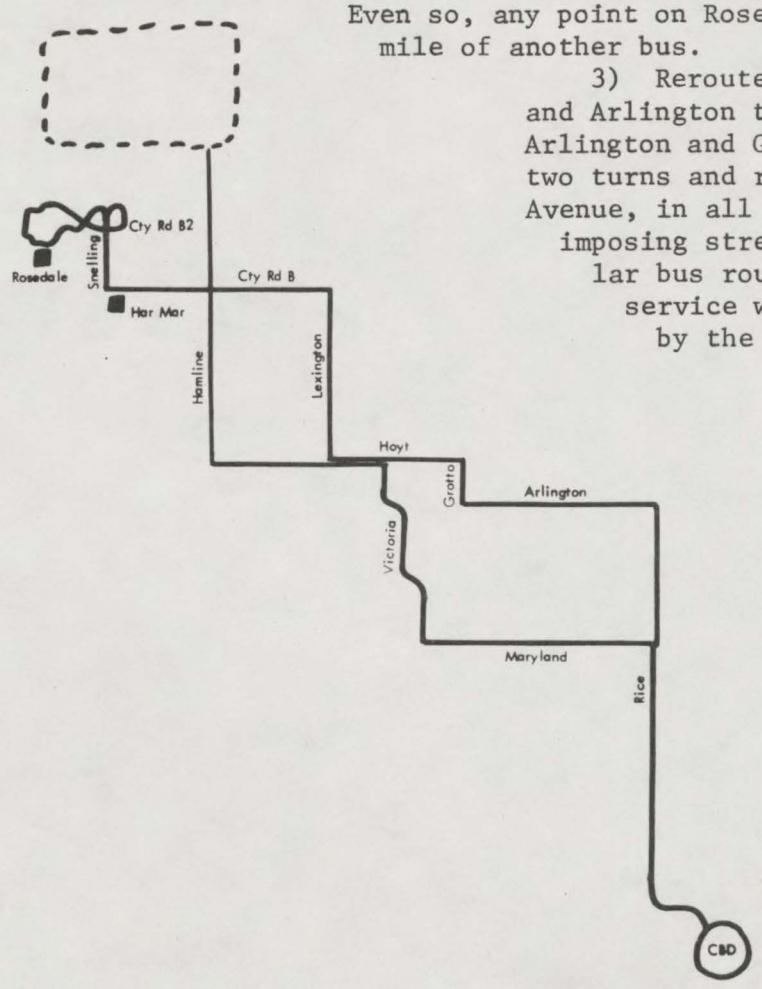
This area needs a complete re-examination It has always been one of the weaker corridors in terms of transit potential. Consequently it features much

route branching, use of extremely large loops, numerous RH-only service and wide-line spacing. Changes in work and shopping orientation have taken place in recent years, and much new residential growth has occurred. This calls for a revamping of all services within the area. These include routes 2, 9, 10, 11, 12, 14, 15, 35B, 3M Express and the services of Rice-Edgerton Lines. There are so many variables involved that this report cannot decide on a definite route structure to recommend. We do feel several improvements are in the offing, though. There will be more crosstown access, more off-peak service on the lighter lines, more expresses to the St. Paul CBD, and considerable shifting of route alignments within St. Paul. All these will probably be the subject of MTC's route-ridership study of Ramsey County, to be carried out during 1973.

No. 12 Roseville

1) Eliminate 12A, G cutback. There is very little to do at Hamline and Hoyt except wait for another bus. Better all #12's should terminate in the Rosedale-Har Mar area.

2) Abandon 12B, H loop on Larpenteur, Snelling and Roselawn. The Snelling side of the loop will be served by #4, the Larpenteur side by #6, leaving only the Roselawn side to be abandoned. Even so, any point on Roselawn is within one-fourth mile of another bus.




3) Reroute 12A, B, C, D from Dale and Arlington to Hoyt and Grotto via Arlington and Grotto. This will save two turns and remove buses from Iowa Avenue, in all likelihood the least imposing street ever to host a regular bus route. Expanded #6 Dale service will fill any gap left by the change.

4) Reroute 12G, H, J,K from Maryland and Victoria to Hoyt and Victoria via Victoria. By moving the Arlington route a little to the west as described directly above, the Maryland bus is allowed a shorter route that saves three turns.

5) Reroute 12C, J from Lexington and Hoyt to Hamline and County B via Lexington and County B.

6) Consider further

extensions of 12D, K.

No. 14 Randolph

1) Eliminate #14A cutback. It is never used.

No. 22 Hi-Rises

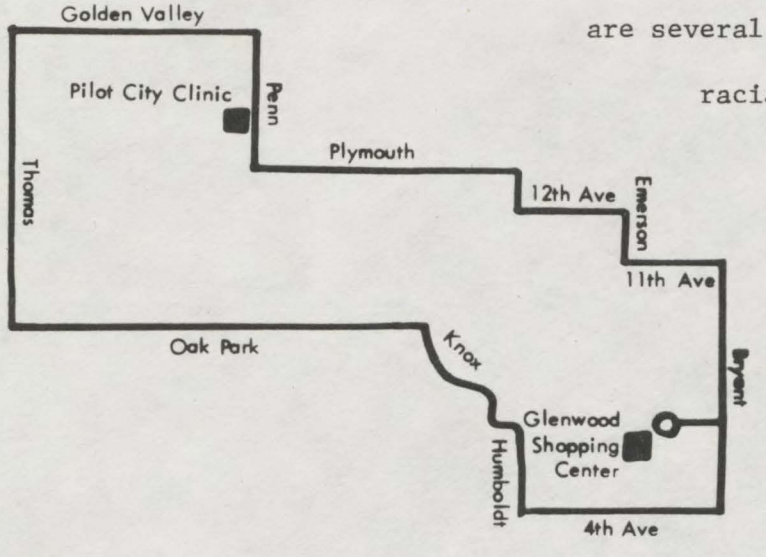
1) Extend to Snelling Avenue. There should be some westerly outlet for the line.

2) The general alignment of this route is that of the old Rondo Avenue line, which was physically removed to build I-94. Perhaps there is more ridership potential than the present limited service indicates. This should be explored.

# NEW SERVICES

## Pilot City Circulator

Within the black community of North Minneapolis, there exists a clear pattern of short trips, mostly for shopping, medical purposes and visiting. The 20 to 40 minute headway of #19 and #20, the two routes that currently serve the area, is too long to handle these trips. Many of them are currently served by taxis. The three local taxi operators have a relatively limited ability to meet the demand for short trips within the north side. There are several reasons for this: racial tension between black passengers and white drivers, the very real threat of robbery (especially at night), the tendency of many black passengers not to tip white drivers, frequent multi-stop trips which are less profitable than through trips, and the very shortness of the runs which brings the driver a smaller return for his time. During times of bad weather or during the first week of each month (when welfare checks are distributed) the demand for cabs is so great that customers are kept waiting for periods of greater than one hour. Under city law no cab company may refuse a request for a cab, but none of the companies would mind seeing this business go elsewhere. Should



the MTC institute a circulator within the Pilot City area, this would free the taxi operators to handle their regular customers who ride to points outside the area. It should be emphasized that the taxi companies do not intentionally skimp on service to the North Side. But, given a choice between sending a cab to a known regular customer or to a short run staying north, the cab dispatcher will try to serve the regular.

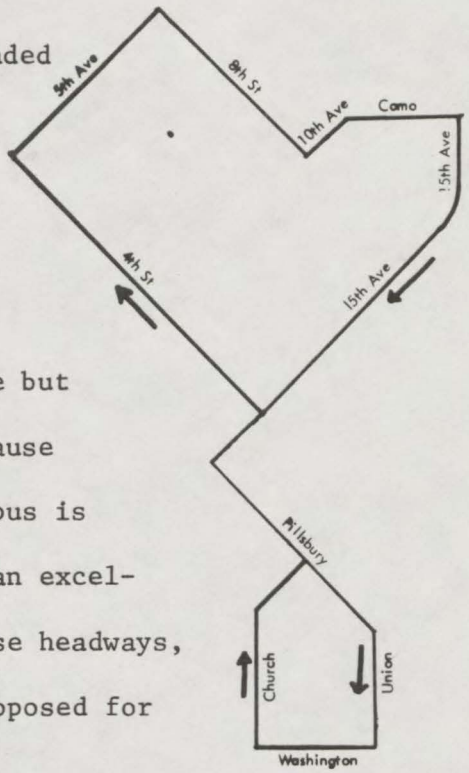
The circulator then, would make a large loop beginning and ending at the Glenwood Shopping Center on Olson Highway. Unless business is extremely heavy, uni-directional service will suffice. Mini-buses would be the most appropriate vehicle, due to the narrowness and light axle loadings permissible on some of the streets involved. Headway should be no longer than every 15 minutes. Given the length of the route, the trip time for once around the loop would be about 15 minutes. We therefore see one bus as capable of handling only 20-minute headway, with some time allowed for layovers. Two buses could therefore handle ten minute headway, which is this report's recommendation.

Fare should be higher than the ten cent downtown QT fare for two reasons. First, the trip involved is longer in most cases. Second, a dime fare will not cover operating costs, no matter how many people are carried. This has been the experience of the well-patronized Nicollet Mall QT. And in the case of the Pilot City area, there is no sponsor like the Downtown Council to cover half the deficit. Unless some agency like OEO volunteers a subsidy, fares should be either 25 cents or 30 cents. The 25-cent figure would reflect the shorter average-trip length and be more convenient for the patrons.

From the Glenwood Center the route follows Bryant north past the two largest senior citizen hi-rises and negotiates more of the "Projects" via 11th Avenue, Emerson and 12th Avenue. Jogging over to Plymouth via

Humboldt, the line passes the senior citizen hi-rise at James, the Way Community Center at Morgan and the Plymouth Bank at Newton. Completely destroyed as a business district in recent years, this street is to be rebuilt. Turning on Penn, it passes the Pilot City Health Center. From there it traverses a medium density residential area via Golden Valley Road, Thomas and Oak Park. At Oak Park and Knox the Camilia House nursing home is served, followed by the nursing home at Olson and Humboldt. Crossing Olson on Humboldt, it re-enters the projects, serving three more hi-rises. Turning onto Fourth Avenue, it passes the Super Valu Supermarket, circles behind the Glenwood Center and stops finally at the center.

Southeast Circulator



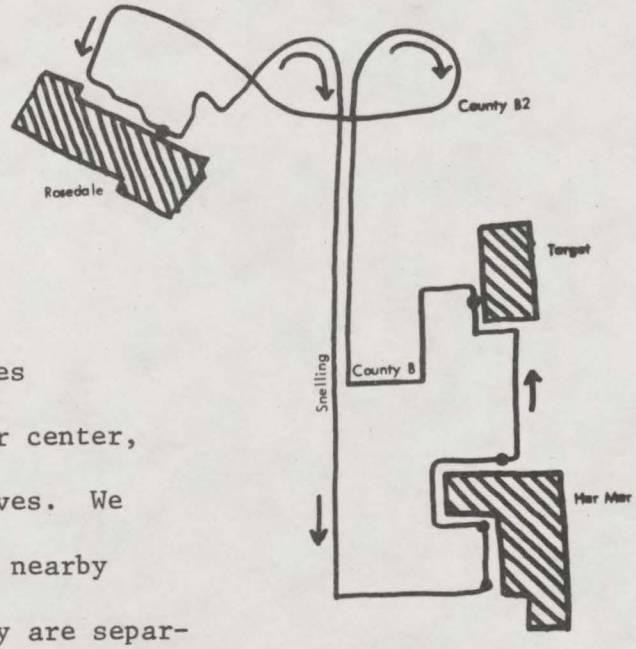

The area in Southeast Minneapolis bounded by University Avenue, East Hennepin and 15th Avenue SE is high density and inhabited largely by University students. The buses that currently serve the area either bypass the campus (#1 and #4) or come close but fail to penetrate the perimeter (#6). Because the average trip from apartment to the campus is in the .25 to 1.5 mile range, the area is an excellent candidate for a circulator. We propose headways, fares and a loop route similar to those proposed for the Pilot City Circulator.

The layover point would be somewhere near the corners of Church and Washington or Union and Washington. From there the route would run through the campus via Church and Pillsbury. At the 15th and Pillsbury traffic circle, it would connect

with the East-West Bank circulator already in existence. From 15th Avenue, it would turn onto Fourth Street and pass through the Dinkytown business district. From there, the route would cover the student residential neighborhoods via Fourth Street, Fifth Avenue, Eighth Street, Tenth Avenue, Como and 15th Avenue.

Rosedale-Har Mar Circulator

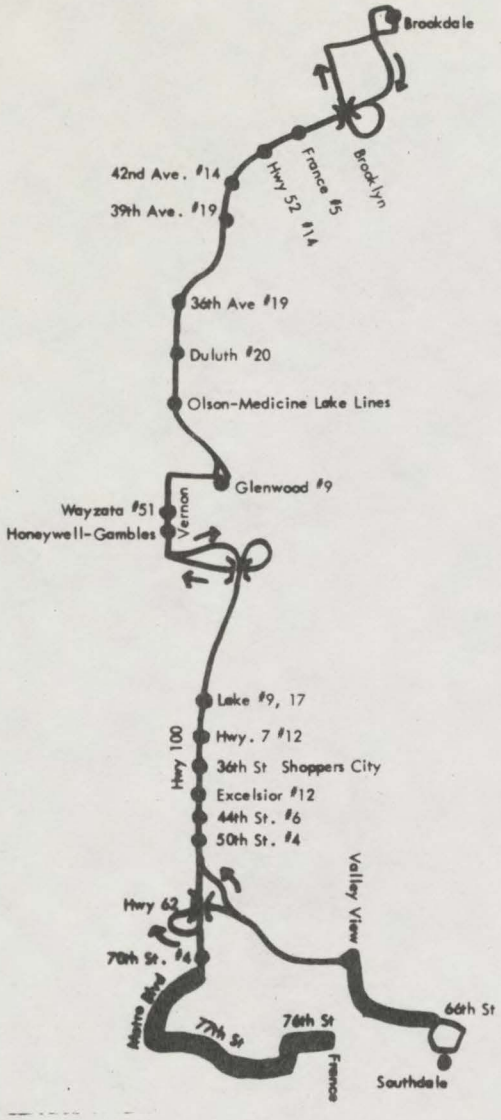
Rosedale and Har Mar are competitors, but nonetheless may be considered as one large diversified center, along with the Target discount store and numerous satellite businesses. Even so, the two large centers are about three-fourths mile apart, the most spread-out suburban center in the Twin Cities. Riders would probably consist of three groups: 1) auto users who want to shop at both centers without moving their car; 2) bus users who want to shop both centers; 3) employees of one center visiting the other center, probably to eat or shop themselves. We do not expect business from the nearby residential neighborhoods. They are separated from the centers by a moat of commercial development and parking lots.




One mini-bus should be enough to provide ten-minute headway, if layovers are scheduled only every third trip or so.

Highway 100 Crosstown

Of the various places a suburban crosstown could be placed, the



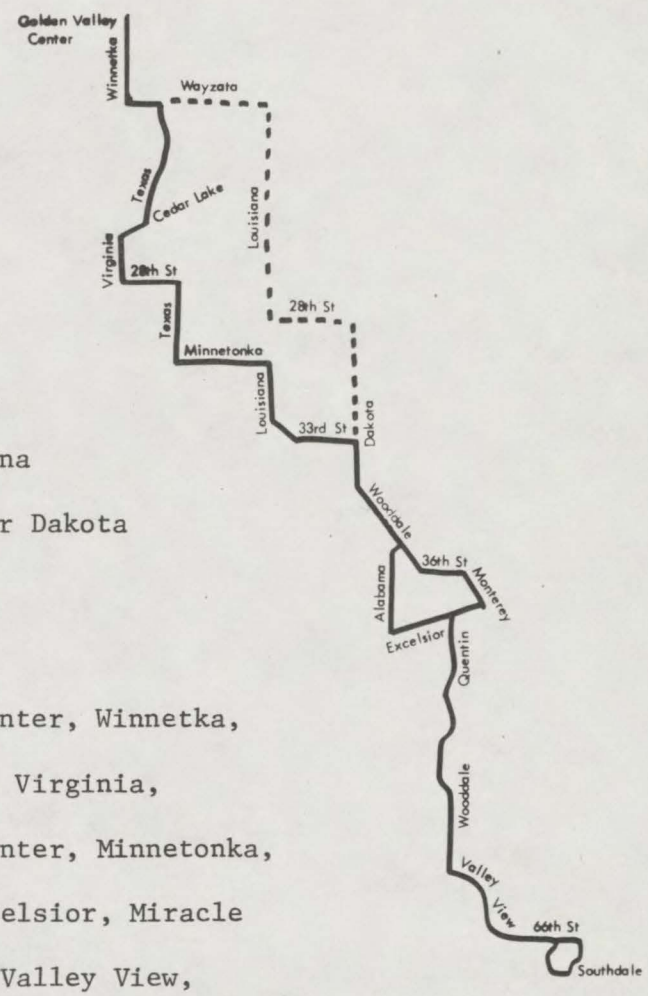

western suburbs along Highway 100 probably have the greatest need. There is no north-south access without going through downtown, yet the area is well-developed. We propose two services to meet the demand; the first is a link of the freeway express loop with which we propose to eventually encircle the center cities. The link runs on Highway 100 from Brookdale to Southdale and the Pentagon Park area. The second service is a local operation using city streets. It runs from Southdale northwest through Edina and St. Louis Park to the Golden Valley Shopping Center. To a certain extent, these two routes will compete for the same passengers. If the seat supply is too much greater than the demand, then only one of the routes will run at any given time; probably the express during rush hours and the street local the rest of the day.

Like its street local counterpart, the Highway 100 Express will modify its route depending on the hour of the day. Industries will be served during the rush hours, shopping centers during the off-peak. Starting at Brookdale, the route follows Highway 100, stopping only to serve centers or transfer points. Thus the list of stops and connecting buses is as follows: Brookdale (#5, #8), France (#5), Highway 52 (#14

RH only), 42nd Avenue (#14), 39th Avenue (#19), 36th Avenue (#19) Shopping Center, Duluth Avenue (#20), Olson Highway (Medicine Lake Lines), Glenwood (#9), Wayzata Boulevard plus local stops on Turner's Crossroad Industrial Park (#9, #51), Minnetonka Boulevard (#9, #17, Richfield Bus Company), 36th Avenue (new street crosstown RH only) Shoppers City, Excelsior Boulevard (#12) Miracle Mile, 44th Street (#6), 50th Street (#4) shopping center, Southdale (off-peak), Pentagon Park (rush hour).

West Suburban Street Crosstown

There are several possible variations in the following route due to trade-offs between better coverage, straighter route and better access to centers. All of these choices appear in St. Louis Park (whether to use Texas or Louisiana north of Minnetonka, Louisiana or Dakota south of Minnetonka). One of the possible recommendations is as follows: Golden Valley Center, Winnetka, Wayzata, Texas, Cedar Lake Road, Virginia, 28th Street, Texas, Texatonka Center, Minnetonka, Louisiana, 33rd Street (RH), Excelsior, Miracle Mile Center, Quentin, Wooddale, Valley View, Southdale.



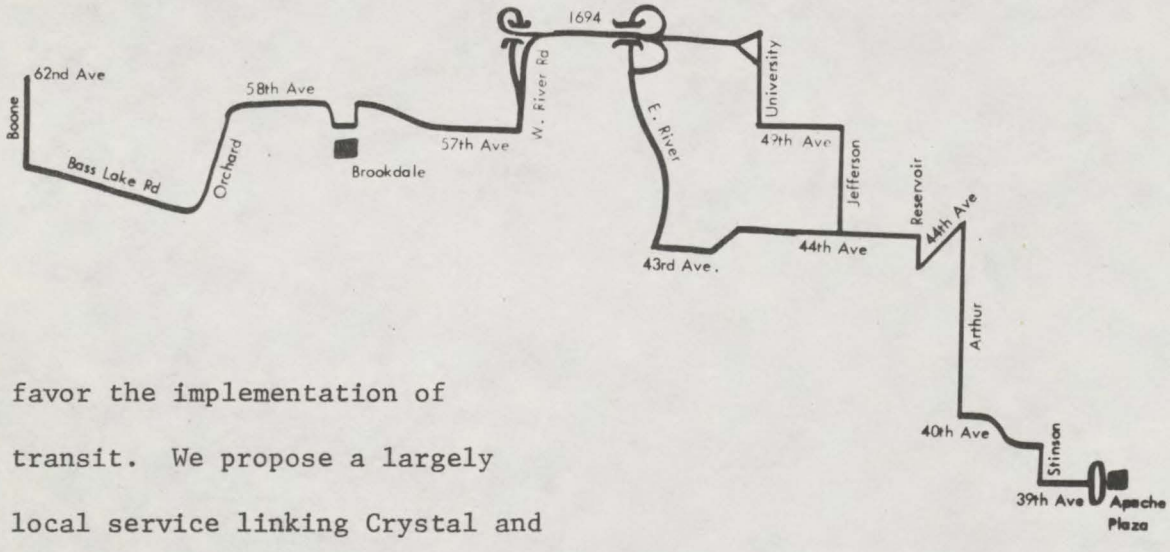

New areas served: Winnetka between Olson and Wayzata, Texas

between Wayzata and Cedar Lake, Quentin and Wooddale between Excelsior and 44th Street, Valley View between Wooddale and Southdale.

Old routes annexed: #6B, Wooddale from Valley View to 54th Street; #17G, Alabama and Excelsior to Wooddale and Dakota; possibly #17D, Wooddale and Dakota to 33rd and Louisiana.

North Suburban Crosstown

Crosstown travel between Minneapolis north and northeast suburbs has only one way of crossing the Mississippi River between Minneapolis and Anoka; it must use I-694. Just west of the river adjacent to the freeway sits a major center, Brookdale. Needless to say, these two factors combine to produce a heavy trip volume and such concentrations




favor the implementation of transit. We propose a largely local service linking Crystal and Brookdale with Fridley, Columbia Heights and Apache Plaza. Like the west suburban crosstown the route will differ somewhat during peak periods to serve employers.

East of Brookdale the route will annex #8F along 57th to Lyndale. This will eliminate a branch, always a good achievement. After crossing the river, rush hour trips would travel East River Road to 43rd Avenue, thereby serving FMC Corporation, the Burlington Northern railroad yards and a number of small industries along Main Street. The regular route

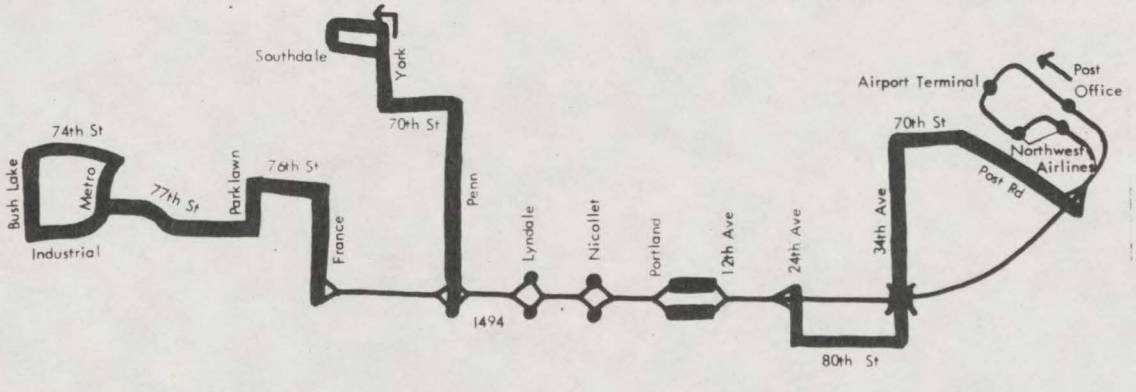
would travel residential neighborhoods via University, 49th Avenue, Jefferson, 44th Avenue, Arthur, 40th, Stinson and 39th Avenue to Apache.

West of Brookdale, the new route would annex the entirety of #5F, which branches from #5 Fremont. Half of its current runs are connecting shuttles, also the situation with 8F, so the effect of combining them is to merge two self-contained routes as well as eliminate two branches.

I-494 Corridor

A great deal of commercial-industrial development has focused on I-494 from the Airport to Highway 100. The crosstown minibus run by Bloomington Bus Company currently serves the southern edge of the development via 82nd, 84th and 86th Street. However, this service runs as a one-way loop (returning via 98th Street), runs only hourly, does not honor MTC transfers and fails to serve areas west of France and east of Cedar.

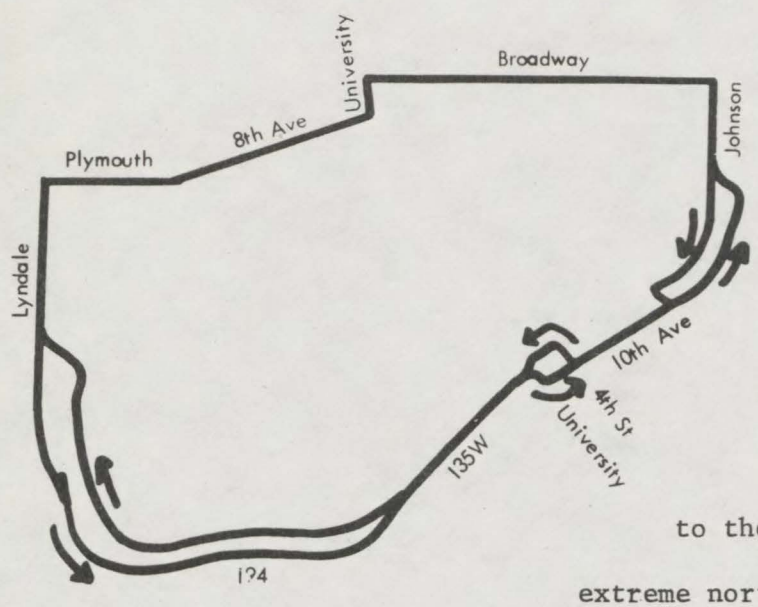
There is no city street that runs through the development for its entire length. Only I-494 itself does that, and that is where the buses must run. Interchanges are of the diamond type, and may be used as stops with no alteration. They occur at roughly half-mile intervals, allowing good coverage. Rush hour service detour to reach the Metro Office Park-Control Data area and Pentagon Park; off-peak service would feed Southdale and bypass the above. There is some question as to the



best way of treating Southtown. Stopping at the freeway ramp will leave passengers with a long walk into the center, but entering the center with the bus will exact a penalty in travel time. Service to the airport on an all-day basis is also questionable, based on the experience with the Airport-Downtown expresses.

Minneapolis Downtown Bypass

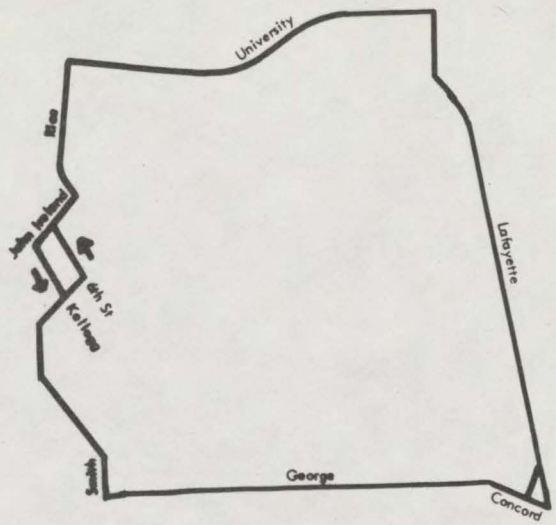
We envision this service as rush hour only, running at no greater than five minute headways. Its purpose would be to cut ride time for certain passengers by bypassing the CBD. Two questions need to be answered: First, is a complete loop needed or can portions be dispensed with and second, what facilities will have to be incorporated into the freeways before the buses can make stops to board passengers? As to the first, only the extreme northeast corners of the loop need not be joined. This amounts to perhaps one-half mile of the route. As to the second, there would have to be adequate pull-off shoulders and stairways from overpasses to accomodate the stops at Nicollet, Third Avenue South, Portland, Park, Chicago, 11th Avenue and Washington.




St. Paul Downtown Bypass

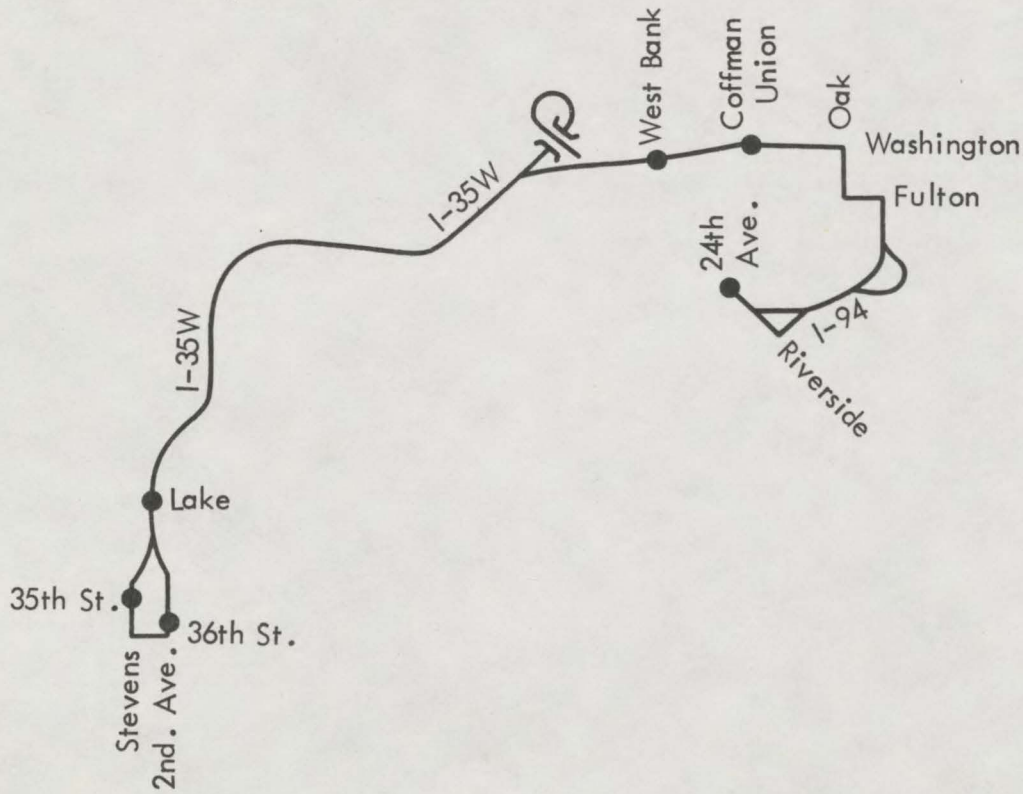
This bypass would resemble its Minneapolis counterpart in its

style of operation - very frequent during the rush hours only. Once again, there are no really dispensable portions of the loop. We would recommend a layover point at Lafayette and East Seventh Street. No special facilities would be necessary.




No. 52A University Express

Create new route from the University of Minnesota to Lake and I-35W via I-94 and I-35W. At Lake and I-35W connections will be made with all I-35W Expresses, MTC #21 and all Bloomington Bus Company expresses. This new route will allow service on University Expresses B and C to be partially eliminated.



B. Cost of Implementation.

How much will it cost to significantly improve bus service? Ultimately, that depends on how many people ride, but let us first examine the raw costs themselves. This report will not dwell on capital costs. These have already been comprehensively examined by the MTC in its Transit Development Report.

We will focus on operating costs, a far greater stumbling block to better service. This is because up to 66% of capital costs can be covered by grants from the Federal Urban Mass Transit Authority (UMTA). There exist, however, no federal subsidies to cover operating deficits. Some aid is forthcoming on the state and local level, but it is quite limited. In specific instances, municipalities have offered to share the deficits of particular routes they consider important. The State of Minnesota has also given the MTC limited power to tax property within a designated transit taxing district of the seven-county metro area.

These aids have been very helpful as far as they have gone. The capital grants have allowed MTC to renew its fleet, build waiting shelters, and generally upgrade its physical plant. The operating subsidies have allowed the MTC to stabilize its fares while preserving virtually all the services inherited from Twin Cities Lines. Thus, the MTC has managed to free itself from the viscious cycle of fare increases, patronage declines, and subsequent reductions in bus miles and route miles.

All this has been accomplished with the aid of limited subsidies. Unfortunately, there has not been enough money to upgrade all services to a truly auto-competitive level, meaning 15-minute headways or better (as defined in the transit surveys), all day freeway express service,

and access to all parts of the metro area from most other parts.

At this point it is important to recognize the two distinct classes of services - those that pay for themselves and those that do not. As a general rule, rush hour services break even at least. Rush hour person trips account for roughly 85% of MTC's patronage. Peak hour services, system-wide, attract over four fares per mile. This is comfortably above the 3 - 3.5 fares per mile normally needed to cover costs. The only factor that threatens rush hour profits is the present shortage of drivers. This has come about largely because of MTC's rapid expansion of rush hour service. The result is that a large amount of expensive overtime wages must be paid.

Certain off-peak services also run in the black. These include the heavy central city routes like #16 University, #5 Chicago-Penn-Fremont, #6 Como-Xerxes-France, #14 Randolph-Payne, and #18 Nicollet. These carry heavy loads all day long. In addition, most other downtown oriented routes break even during the midday on their in-city trunklines.

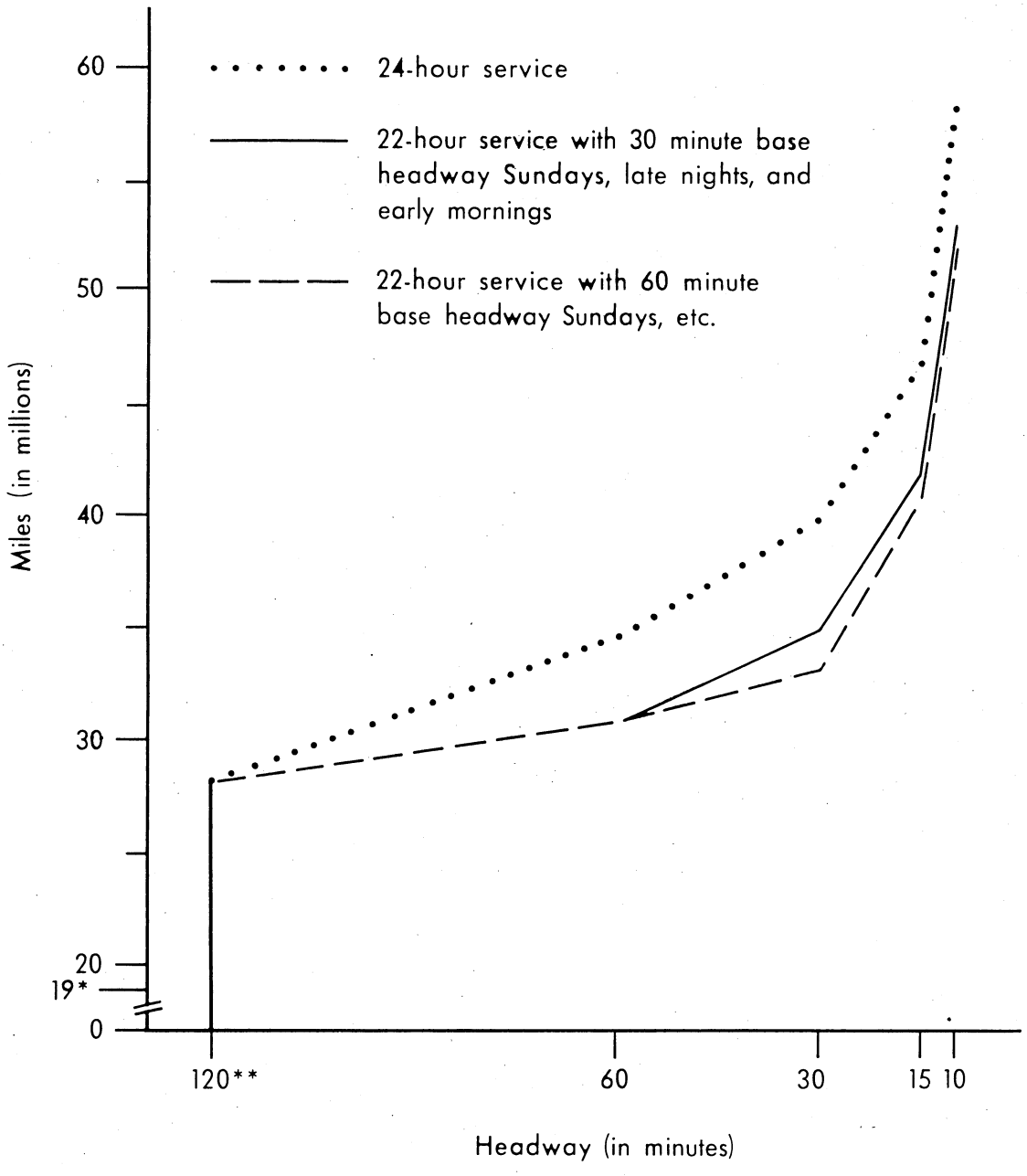
What remains after these exceptions are the losers. They include virtually all the suburban, crosstown and QT routes, as well as almost every nightime, early morning and Sunday service. The result is a system that covers roughly 80 - 90% of its costs out of the far box.

Rush hour, then, is not really a problem. MTC currently is fielding every available bus, and has plans to put every fleet expansion to immediate use. The rush hour system is approaching an auto-competitive level in many travel corridors.

The stumbling block then is the off-peak. What will it cost to raise off-peak service to an auto competitive level? The accompanying graph and tables (Figure 24 and Tables 3 and 4) illustrate increases in annual bus miles necessary to provide optional levels of off-peak

FIGURE 24

**ESTIMATED 1980 ANNUAL BUS MILES**




*MTC currently operates 19.44 million miles annually.

**120 minutes is used here to represent headways that range from 60 minutes to eight hours. In other words, there is no base headway for MTC's current or proposed services.

TABLE 3
ESTIMATED 1980 ANNUAL BUS MILES (IN MILLIONS)

| Headway | Rush Hour Mileage | % increase over current mileage | % increase over MTC mileage | Off-Peak mileage | % increase over current mileage | % increase over MTC mileage | Total | % increase over current mileage | % increase over MTC mileage |
|---|---|---|---|---|---|---|---|---|---|
| Current MTC mileage | 8.36 | --- | --- | 11.09 | --- | --- | 19.44 | --- | --- |
| MTC's proposals | 16.62 | 98.5 | --- | 12.34 | 16.3 | ---- | 28.96 | 48.9 | --- |
| All subsequent figures include the above totals, and also allow for an addition of 200 miles off new off-peak service routes. | | | | | | | | | |
| Maximum off-peak - 60 min. | 16.62 | 98.5 | --- | 14.20 | 33.6 | 10.7 | 30.82 | 58.6 | 6.4 |
| Maximum off-peak - 30 min. | 16.62 | 98.5 | --- | 19.33 | 81.9 | 56.7 | 35.96 | | |
| Maximum off-peak - 30 min. except 60 min. Sundays, late nights and early morning | 16.62 | 98.5 | --- | 18.11 | 70.4 | 46.8 | 34.73 | 78.6 | 19.9 |
| Maximum off-peak - 15 min. except 60 min. Sundays, etc. | 16.62 | 98.5 | --- | 24.63 | 131.8 | 99.7 | 41.97 | 115.8 | 44.9 |
| Maximum off-peak - 15 min. except 30 min. Sundays, etc. | 16.62 | 98.5 | --- | 26.88 | 152.9 | 117.9 | 43.51 | 123.8 | 50.2 |
| Maximum off-peak - 10 min. except 60 min. Sundays, etc. | 16.62 | 98.5 | --- | 37.32 | 251.1 | 202.5 | 53.94 | 177.5 | 86.2 |
| Maximum off-peak - 10 min. except 30 min. Sundays,etc. | 16.62 | 98.5 | --- | 38.87 | 265.7 | 215.0 | 55.49 | 185.4 | 91.9 |

TABLE 4

Off-Peak Patronage Increases

The following chart represents increases in annual MTC bus miles during off-peak hours over the 1972 figure of 11.09 million miles.

Patronage increases are determined by the number of passengers the new service carries per bus mile.

| Headway | Mileage Increase In Millions | Number of riders per mile | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | .5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| MTC Proposals | 1.25 | .625 | 1.25 | 1.87 | 2.5 | 3.12 | 3.75 | 4.38 | 5.0 |
| 60 Minute | 3.11 | 1.55 | 3.11 | 4.67 | 6.22 | 7.78 | 9.33 | 10.89 | 12.44 |
| 30 Minute | 8.24 | 4.12 | 8.24 | 12.36 | 16.43 | 20.6 | 24.72 | 28.84 | 32.96 |
| 30 Min. except 60 Min. Sun., late nights, & early mornings. | 7.02 | 3.51 | 7.02 | 10.53 | 14.04 | 17.55 | 21.06 | 24.57 | 28.08 |
| 15 Min. except 60 Min. Sun., etc. | 13.54 | 6.77 | 13.54 | 20.31 | 27.08 | 33.85 | 40.62 | 47.39 | 54.16 |
| 15 Min. except 30 Min. Sun., etc. | 15.79 | 7.89 | 15.79 | 23.68 | 31.58 | 39.47 | 47.37 | 55.27 | 63.16 |
| 10 Min. except 60 Min. Sun., etc. | 26.23 | 13.12 | 26.23 | 39.35 | 54.46 | 65.58 | 78.69 | 91.8 | 104.9 |
| 10 Min. except 30 Min. Sun., etc. | 27.78 | 13.89 | 27.78 | 41.67 | 55.56 | 69.45 | 83.34 | 97.23 | 111.12 |

Under MTC proposal, rush hour mileage will increase 8.26 million miles. At 4.5 per mile, increased patronage should be 37.16 million riders by 1980.

Off-peak service currently carries from 1.02-1.52 riders per mile, as opposed to peak hour traffic of 4.43-5.3 riders per mile. If this trend continues, the appropriate columns above are indicative of the increase in ridership that can be expected.

This figure is suspect, however, because it exceeds by at least 15 million the MTC's own 1980 ridership forecast. Where the discrepency occurs is unclear.

service and the resultant off-peak patronage to be expected at various service levels, given differing numbers of patrons per mile. These estimates are admittedly made using a generalized approach. Service improvements will doubtless be made more selectively and not with such a "blanket" methodology. Nonetheless, some priorities and cost magnitudes emerge. Twenty-four hour service is an improvement advocated by many. Yet the cost of reinstating even hourly "owl" buses would be equivalent to the cost of putting half-hourly service, 22 hours per day, on all lines that currently have less than that frequency. Thus, 24-hour service, in the eyes of the authors, receives a rather low priority. As the graph shows, the number of added bus miles increases geometrically as headways are decreased arithmetically. At some point the cost no longer is justified by the increased attractiveness of the service and a point of diminishing returns is reached. We feel such a point falls after a fifteen minute base headway has been achieved, with the exception of crosstown routes and routes with enough patronage to pay for better service.

Unfortunately, achieving a 15-minute system-wide base headway would require more than twice the MTC's total current annual mileage. That is a tall order, although equipment would not be a problem. MTC's proposed expanded fleet will be adequate to handle the load. This is because off-peak improvements still require fewer buses during any one-hour period than will occur under MTC's rush hour proposals. Thus, the purchase of additional buses is not a factor.

Even the costs of running the vehicles is a comparatively minor consideration. The dominant cost in running a bus is labor. Indeed, it is the "achilles heel" of bus transit. Bus transit is a labor intensive industry. There is a definite ceiling on worker productivity, but

none on worker costs. The ceiling is determined by the speed and capacity of the vehicle. The more miles a bus covers during a one hour period, the lower the driver cost per mile. There is some room for speed improvement in the present system, but its effect would be minor economically, if noticeable at all. The only real hope is to increase the load per bus. Unfortunately, rush hour buses are currently loaded to their limits, with isolated exceptions. Barring the adoption of larger, articulated buses, the rush hour trips are as productive as they are ever going to be.

This leaves the off-peak as the last frontier. The Suburban Transit Survey has indicated the levels transit service must reach before it can begin to compete with the automobile, but nobody knows if such good service would ever attract enough riders to pay for itself. All we know is that mediocre service has almost consistently failed to pay its own way. Personally, the authors are doubtful that very good service will do more than accumulate very large deficits so long as the automobile remains as accessible to the public as it currently is.

It is common knowledge that it costs more per mile to own and operate an auto than to use the bus. But the oft-made point remains - an American's mobility has become one of his most cherished possessions. Mobility has become fundamental to his lifestyle. As the cliche goes, people want better transit for someone else, so they can have the freeways to themselves.

Even though auto costs continue to rise at least as fast as any others, they do not rise fast enough to reduce auto use to any degree. However, this status quo may shortly dissolve. Recently, and quite suddenly, the nation has found itself growing short on fuel. Already the oil companies are cutting back on supplies to low-profit customers.

It should not be long before fuel prices go up drastically. Rationing is starting to take place. The lower a person's income, the more his automobile mobility will be eroded.

This happened during World War II, albeit under different circumstances, and public transit found itself with more business than it could handle. This may occur again in the near future. People will not be happy about a reduction in mobility, but it will fill buses, and this fact alone changes all transportation ground rules.

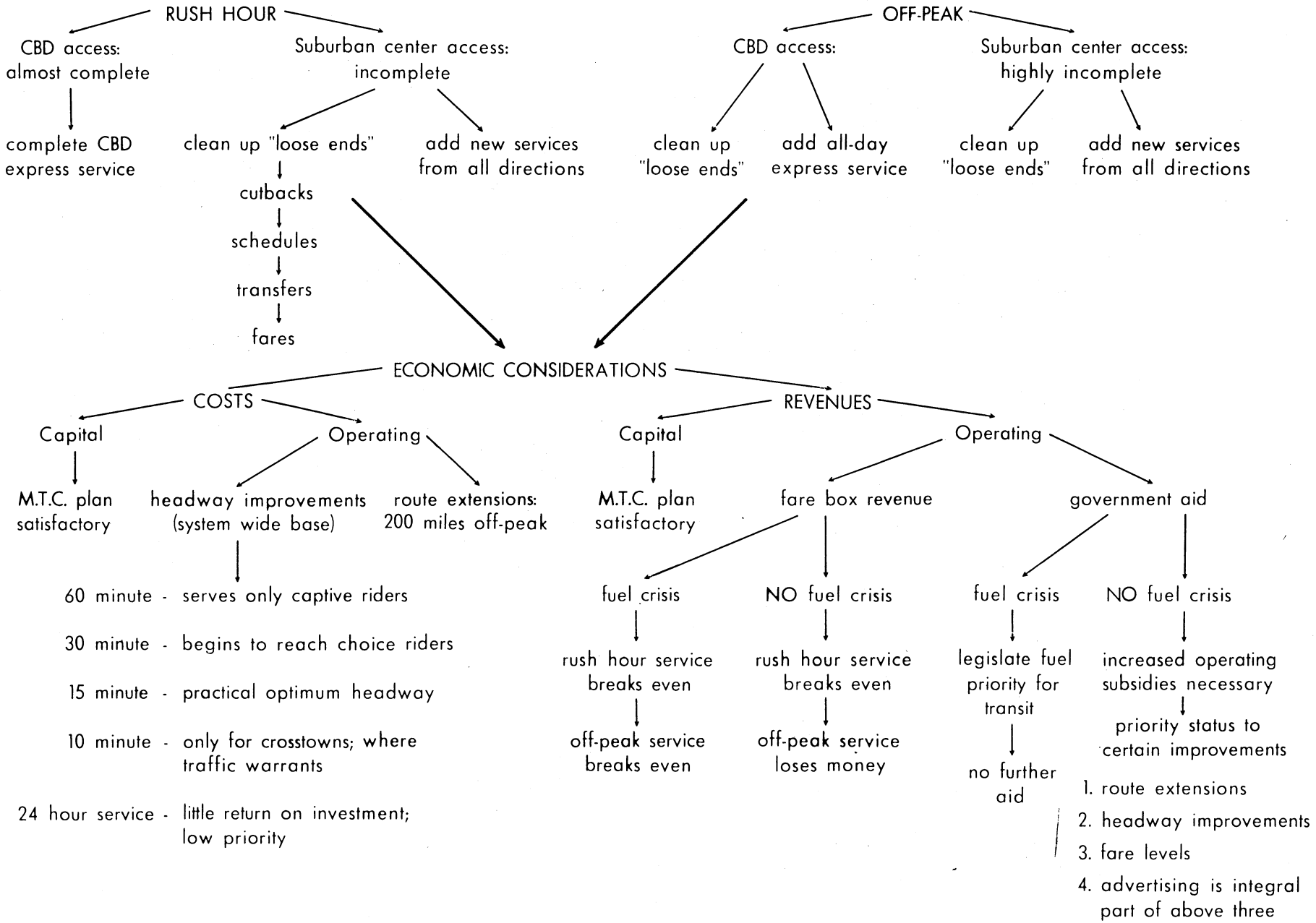
The only cloud on this particular horizon is that transit fuel may become as scarce as auto fuel, in which case everybody loses. Indeed, MTC came within a narrow margin of curtailing its services for lack of fuel last winter. One can only hope that some priority is given to transit use of fuel at the expense of the automobile. Such action would surely have to take place on the federal level. No state has the power to control fuel supplies within its borders, short of martial law. For that matter, most states do not have the political or financial power to take on the large oil companies. It is questionable if even the federal government can. If not, the oil producers will have us all "over a barrel". The greater profit to be made selling gasoline will then dictate who gets fuel and for what purpose.

To conclude, the question of costs comes down to one important variable, the availability of fuel. If the situation continues as it has, then the transit business will proceed more or less as before, only the subsidies will have to increase each year. If the fuel crisis comes, and transit gets a guaranteed fuel priority, this industry will become truly viable for the first time in a half century. The following flow chart provides an overall scheme for short range transit improvements (Figure 25). Rush hour and off-peak service improvements, as discussed

in Chapter IV, are outlined, as well as the resulting cost and revenue options reviewed in this chapter.

FIGURE 25

## SHORT RANGE TRANSIT IMPROVEMENTS



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## APPENDIX B.

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# APPENDIX C. JONATHAN CASE STUDY

The new town of Jonathan in the City of Chaska, Minnesota offers opportunities for the application of various types of bus technology. Jonathan is located approximately 25 miles southwest of the Minneapolis CBD and has been designated as a future Major Diversified Center by the Metropolitan Council. At the present time, Jonathan's population is approximately 1500. Jonathan and its industrial park now employ about 600 people. Ultimately Jonathan hopes to have a population of 50,000 inhabitants and an employment base of 22,000 jobs. It has been the experience of other new towns in both the United States and Great Britain that substantial portions of the new town populations commute to work each day and that many of the new town jobs are held by non-residents. Although it is impossible to predict how many of Jonathan's residents will commute each day or how many non-residents will work in Jonathan, it is safe to assume that the numbers will be substantial and that some type of mass transit will be needed. This need becomes apparent when one considers that Jonathan is located 25 miles from Minneapolis' CBD in the Southwest Development Sector. This sector has the highest highway volume/capacity ratio in the Metropolitan Area.
We feel it would be most beneficial to Jonathan residents if the Metropolitan Transit Commission and/or the Jonathan Development Corporation initiated the following proposals as soon as possible.

Proposal #1 - Express Bus Service to Southdale, Minneapolis CBD, and Hopkins.

A survey of Jonathan's residents was conducted to determine their interest in some type of express bus service. It was noted before the survey that most residents were employed in either the Minneapolis CBD,

the Southdale/I-494 area, or the Hopkins area. The results of the survey showed that although 60% of those surveyed indicated that they would use the service, only 10% indicated that they would use the service on a daily basis.

If this service is to be comprehensive, we recommend that two express bus routes be established. One route would serve Highway 5 (Chanhassen, Eden Prairie) and I-494 (Pentagon Park, Southdale, Southtown, Metro Office Park). The other route would serve Highway 7 (Excelsior, 7-Hi Shopping Center, Knollwood Plaza, Hopkins), the Minneapolis CBD, and the University of Minnesota. These locations would offer transfers to other bus routes of the MTC and the Bloomington Bus Company. Furthermore, these transfers greatly increase the flexibility and range of this proposal by offering accessibility to many additional employment and shopping areas for Jonathan residents.

Proposal #2 - Dial-a-Ride.

The Dial-a-Ride demand-responsive bus concept is particularly well suited for a place like Jonathan. The Metropolitan Transit Commission's "Report on Dial-a-Ride Technology" (July, 1972) stated that this type of bus technology is particularly well suited for areas which are tributary to Major Diversified Centers and for intra-area requirements. Upon its completion, Jonathan will serve Carver and western Hennepin counties as a diversified center. Chaska and the surrounding communities of Chanhassen, Excelsior, Waconia, Victoria, Carver, St. Bonifacius, Cologne and Eden Prairie will probably have residents working in Jonathan. A Dial-a-Ride system could effectively serve these people. This type of system could serve intra-area employment, shopping and medical trips, inter-area employment, on and off peak trips, and as a feeder system for the express bus service.

Proposal #3 - Computerized Car Pool.

This concept could serve both Jonathan residents who commute out to work and non-residents who work in Jonathan. Car pools would be highly complementary to a Dial-a-Ride system and could precede the express bus service until sufficient patronage has been developed to render the express bus economically feasible. Even after the establishment of express bus service, car pools would be beneficial. Data collection and organization would present no problem if the Jonathan Residents' Association would cooperate in the establishment of this car pool.

The computer program, utilized by the University of Minnesota's Computerized Car Pool, is adaptable to Jonathan's situation according to David Licht of the University's Physical Planning Department. The necessary adjustment of the University's computer program , which involves a "many-to-one" concept, could be programmed for Jonathan. Presently, Jonathan is involved in a "one-to-many" concept of commuting. As Jonathan grows, however, this will evolve to a "many-to-many" concept. The University's computer program could be available to Jonathan for use by the end of 1973. Community Information Systems, a Jonathan based firm, will have the capability to utilize the Computerized Car Pool before the end of 1973. For the time being, however, an index card file system will suffice because of the small population of Jonathan.

The Metropolitan Transit Commission has a unique opportunity to observe the evolution of a Major Diversified Center as it relates to transit in Jonathan. Jonathan is now in its early stages of development. The establishment of transit services at this time would perhaps require subsidies but the cost of these subsidies would be overshadowed by the benefits. Jonathan is unlike most other Major Diversified

Centers in that residential, commerical and industrial growth are centrally coordinated. This central coordination would also seem to facilitate transit planning and allow the MTC to accurately observe demand and response to transit programs over time. Thus after Jonathan's maturation period, the MTC would possess an extremely useful model of transit growth and development. This model could be applied to other Metropolitan Area Diversified Centers, regardless of their stage of development.

# APPENDIX D. THE SUBURBAN TRANSIT SURVEY

The Suburban Transit Survey was conducted by the Department of Geography as an integral part of the field work for the Project in Urban Transportation. The purpose of the survey was to determine suburban attitudes toward public transportation and to aid in the overall analysis of transit in the Twin Cities area. Because of the geographical scope and potential importance, regarding future transit decisions of the survey, the Twin Cities Metropolitan Transit Commission offered clerical, postal, and financial assistance. The survey itself was drawn up jointly by the Metropolitan Transit Commission's Government Division personnel and the authors of this report. All data tabulation and analyses were carried out by the authors.

Approximately 1050 surveys were mailed out to suburban residents in the Twin Cities Metropolitan Area during January and February 1972. All suburbs containing more than 2000 residents were included in the survey. Forms were mailed to each community on the basis of one survey per one thousand residents. The rate of return for the mail survey was approximately 35%. Data was then tabulated on a community and corridor basis with the final results calculated as shown in the following pages. In an effort to confirm the mail survey results, a similar telephone survey was conducted. Randomly chosen telephone numbers of suburban residents were selected by municipality. Over one-hundred individuals and households were contacted by telephone using the same survey question. The results obtained, as shown in the text, reinforced the findings of the mail survey. A sample copy of the cover letter and survey form follow.

TWIN CITIES AREA METROPOLITAN TRANSIT COMMISSION
330 Metro Square Building, Saint Paul, Minnesota 55101 Phone 612/227-7343

January 18, 1972

Dear friend

Please spend a moment with the enclosed questionnaire, which is part of a study of the potential for mass transit in the suburban Twin Cities area. Funded by the U S Department of Transportation, the study is being carried out by the University of Minnesota in cooperation with the Metropolitan Transit Commission.

By use of the questionnaire results we hope to determine the amount of public transit service necessary in any given area.

You will notice that four blanks appear after most of the questions. These will allow separate responses from members of your household. For purposes of the questionnaire, please disregard school trips on buses operated by the local school district.

As we are sampling a relatively small proportion of households, the responses of your family will be of great importance in achieving valid results. Please help us by filling in the form and mailing it in the enclosed, postage-paid envelope.

Yours truly

Doug Kelm

Doug Kelm
Chairman

DK/cam

enc

# TRANSIT SURVEY

Check (X) for each family member

| | Person # 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| I am: | | | | |
| a driver | — | — | — | — |
| a non-driver | — | — | — | — |
| I currently use public transit: | 1 | 2 | 3 | 4 |
| for commuting (to work or school) | — | — | — | — |
| for other trips | — | — | — | — |
| not at all | — | — | — | — |

Our household has the use of the following number of automobiles:

0_____
1_____
2_____
more than 2_____

Listed below are several characteristics of public transit service. The blanks after each allow you to select the quality of service that you think appropriate. If you currently use public transit, select the levels of service that you would like to have available. If you do not use public transit, indicate what levels of service would persuade you to use it.

| | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| A. | How many blocks would you walk from home to the nearest stop on a regular basis? | — | — | — | — |
| B. | How many blocks would you walk from transit stop to your destination on a regular basis? | — | — | — | — |
| C. | Facilities available at the transit stop. (Check more than one if you wish) | 1 | 2 | 3 | 4 |
| | no facilities | — | — | — | — |
| | heated enclosed waiting shelter | — | — | — | — |
| | parking lot | — | — | — | — |
| | garage | — | — | — | — |
| | shopping | — | — | — | — |
| D. | How long would you be willing to wait for a bus (in minutes)? | — | — | — | — |
| E. | How many transfers per trip would be acceptable to you? | — | — | — | — |

F. Availability of schedule information. (Check more than one if you wish)

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| by telephone | _ | _ | _ | _ |
| posted at the transit stop | _ | _ | _ | _ |
| available by mail and at public places | _ | _ | _ | _ |

G. Assume a trip by auto takes 20 minutes. How long should a transit trip compare (in minutes)?

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| transit 15-30 minutes longer | _ | _ | _ | _ |
| transit 5-15 minutes longer | _ | _ | _ | _ |
| same time for both | _ | _ | _ | _ |
| transit faster | _ | _ | _ | _ |

H. If the quality of service you want were available, what is the maximum you would pay for a one-way trip?

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| $1.00 or more | _ | _ | _ | _ |
| .75 | _ | _ | _ | _ |
| .50 | _ | _ | _ | _ |
| .25 | _ | _ | _ | _ |
| .10 | _ | _ | _ | _ |
| free | _ | _ | _ | _ |

I. Which of the above characteristics is most important to you? (Write one letter from A-H in the blank.)

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| _ | _ | _ | _ |

J. If the quality of service that you want were available, would you dispose of one automobile?

Yes _____
No _____
Not sure _____

Please add any comments below.

Thank you for your cooperation!

# SUBURBAN TRANSIT SURVEY

| Summary of Data 2-14-72 | Mail Survey | Telephone Survey |
|---|---|---|
| Households responding | 249 | 113 |
| Individuals responding | 834 | 115 |
| Drivers | 74% | 83% |
| Non-drivers | 26% | 17% |
| Use of transit | | |
| Commuting | 5.9% | 3.4% |
| Other | 18.2% | 16.5% |
| Not at all | 75.7% | 81.1% |

Mail Survey

| Numbers of cars per household | | 0 | 1 | 2 | 2+ | Total |
|---|---|---|---|---|---|---|
| Willingness to be rid of one automobile | NO | (0.1) | (77.3) | (47.2) | (46.4) | (55.6) |
| | YES | | ( 6.1) | (27.1) | (21.4) | (20.1) |
| | NOT SURE | | (16.4) | (25.6) | (32.1) | (23.2) |

Telephone Survey

| | 0 | 1 | 2 | 2+ | Total |
|---|---|---|---|---|---|
| NO | (2.8) | (77.1) | (70.9) | (23.0) | (65.0) |
| YES | | (14.2) | (23.6) | (38.4) | (21.6) |
| NOT SURE | | ( 8.5) | ( 5.4) | (38.4) | (12.2) |

Desired walking distance - home to stop

| | | |
|---|---|---|
| 1 block | 21.2% | 19.2% |
| 2 blocks | 40.3% | 37.6% |
| 3 blocks | 18.2% | 21.1% |
| 4 blocks | 11.7% | 10.0% |
| 5+ blocks | 8.3% | 11.9% |

Desired walking distance - stop to destination

| | | |
|---|---|---|
| 1 block | 21.9% | 16.5% |
| 2 blocks | 41.1% | 39.4% |
| 3 blocks | 19.9% | 19.2% |
| 4 blocks | 12.6% | 13.7% |
| 5+ blocks | 4.3% | 11.0% |

Desired facilities at stop (more than one choice allowed)

| | | |
|---|---|---|
| None | 176 | 15 |
| Heated shelter | 366 | 68 |
| Parking | 193 | 22 |
| Garage | 24 | 2 |
| Shopping | 114 | 22 |

| | Mail Survey | Telephone Survey |
|---|---|---|
| Totals: Waiting time | | |
| 0-5 Minutes | 29.6% | 14.0% |
| 5-10 | 44.1% | 32.7% |
| 11-15 | 21.8% | 29.9% |
| 16-30 | 4.4% | 23.3% |
| Total: Comparative speed | | |
| Transit 15-30 Min. longer | 21.0% | 21.4% |
| 5-15 Min. longer | 56.3% | 64.4% |
| Same time | 15.2% | 10.2% |
| Transit faster | 7.3% | 3.7% |
| Desired number of transfers | | |
| 0 | 21.8% | 9.4% |
| 1 | 56.7% | 53.7% |
| 2 | 18.9% | 33.0% |
| 3 | 2.3% | 2.8% |
| 4 | -- | .9% |
| Availability of schedule information (more than one choice allowed) | | |
| By telephone | 442 | 53 |
| Posted at stop | 379 | 60 |
| Sent by mail | 379 | 62 |
| Desired fare for one-way trip | | |
| $1.00 + | 4.6% | 6.4% |
| .75 | 16.7% | 15.5% |
| .50 | 55.2% | 46.7% |
| .25 | 20.9% | 25.6% |
| .10 | 0.9% | 2.7% |
| free | 1.4% | 2.7% |
| Most important aspect of service | | |
| Distance home to stop | 15.6% | 23.2% |
| Distance stop to destination | 5.2% | 1.1% |
| Facilities at stop | 10.0% | 4.6% |
| Waiting time | 15.7% | 37.2% |
| Number of transfers | 3.7% | 2.3% |
| Schedule availability | 1.9% | 5.8% |
| Comparative speed (transit vs. auto) | 29.4% | 22.0% |
| Fare level | 18.0% | 3.4% |

## FINAL TOTAL

| | | |
|---|---|---|
| Households responding | 488 | |
| Individuals responding | 1033 | (2.12/house) |
| Drivers | 781 | (75.6%) |
| Non-drivers | 252 | (24.4%) |
| Use of transit | | |
| Commuting | 56 | ( 5.7%) |
| Other | 178 | (18.14%) |
| Not at all | 747 | (76.14%) |

Number of cars per household

| Willingness to be rid of one automobile | 0 | 1 | 2 | 2+ | Total |
|---|---|---|---|---|---|
| NO | 6 | 110 (76.9) | 139 (52.7) | 17 (36.2) | 266 (57.8) |
| YES | | 13 ( 9.1) | 70 (26.5) | 13 (27.7) | 96 (20.9) |
| NOT SURE | | 20 (14.0) | 55 (20.8) | 17 (36.2) | 92 (20.0) |
| TOTAL | 6 (1.3) | 142 (31.1) | 264 (57.4) | 47 (10.2) | 460 Total Cars |

Desired walking distance - home to stop

| | | |
|---|---|---|
| 1 block | 149 | (20.2%) |
| 2 blocks | 301 | (40.8%) |
| 3 blocks | 136 | (18.5%) |
| 4 blocks | 82 | (11.1%) |
| 5+ blocks | 69 | ( 9.4%) |

Desired walking distance - stop to destination

| | | |
|---|---|---|
| 1 block | 145 | (20.0%) |
| 2 blocks | 303 | (41.9%) |
| 3 blocks | 146 | (20.2%) |
| 4 blocks | 90 | (12.4%) |
| 5+ blocks | 40 | ( 5.5%) |

Desired facilities at stop

| | |
|---|---|
| None | 208 |
| Shelter | 480 |
| Parking | 236 |
| Garage | 27 |
| Shopping | 150 |

Waiting time

| | | |
|---|---|---|
| 0-5 minutes | 185 | (24.5%) |
| 5-10 minutes | 274 | (36.3%) |
| 11-15 minutes | 154 | (20.4%) |
| 16-30 minutes | 56 | ( 7.4%) |
| 30+ minutes | --- | ( 0%) |
| Checked (Erroneous response) | 86 | (11.4%) |

| | | |
|---|---|---|
| Comparative speed | | |
| 15-30 minutes longer | 157 | (20.7%) |
| 5-15 minutes longer | 438 | (57.7%) |
| Same time | 114 | (15.0%) |
| Transit faster | 50 | ( 6.6%) |
| Desired number of transfers | | |
| 0 | 139 | (19.1%) |
| 1 | 418 | (57.6%) |
| 2 | 150 | (20.7%) |
| 3 | 17 | ( 2.3%) |
| 4 | 2 | ( 0.3%) |
| Availability of schedule information | | |
| By telephone | 551 | |
| Posted at stop | 498 | |
| Sent by mail | 499 | |
| Desired fare for one-way trip | | |
| $1.00 | 41 | ( 5.1%) |
| .75 | 134 | (16.5%) |
| .50 | 439 | (54.2%) |
| .25 | 174 | (21.5%) |
| .10 | 10 | ( 1.2%) |
| free | 12 | ( 1.5%) |
| Most important aspect of service | | |
| Distance home to stop | 126 | (16.8%) |
| Distance stop to destination | 34 | ( 4.5%) |
| Facilities at stop | 68 | ( 9.1%) |
| Waiting time | 144 | (19.3%) |
| Number of transfers | 27 | ( 3.6%) |
| Schedule availability | 18 | ( 2.4%) |
| Comparative speed (transit vs. auto) | 216 | (28.9%) |
| Fare level | 115 | (15.4%) |

## Appendix E. The Central City Transit Survey

### Methodology

The Central City Transit Survey was conducted by telephone, using a slightly modified Suburban Transit Survey format. Randomly-selected telephone numbers from Minneapolis zip code zones were dialed. Approximately 120 persons (or households) were surveyed between November and December 1972. Several minor differences between this survey and the preceding one may be noted. In the Central City Transit Survey questions were included regarding age groupings and frequency of service which are not found in the Suburban Transit Survey. The only other difference is the omission of cross tabulations in the Central City Transit Survey data analysis.

### The Survey Results

The following pages include the raw data and percentage calculations for the Central City Transit Survey questions. Again, the reader is urged to note the data carefully, in particular the common trends and differences between the two transit surveys.

### Results of the Minneapolis Transit Survey

| | | | % |
|---|---|---|---|
| 1. | Drivers | 87 | 72.5 |
| | Non-drivers | 33 | 27.5 |
| | Total | 120 persons | 100.0% |

| 2. Age Groupings | 0-20 | 20-40 | 40-60 | 60+ |
|---|---|---|---|---|
| # of persons | 29 | 25 | 38 | 28 |
| % | 24.2 | 20.8 | 31.7 | 23.3 |

3. Use of Public Transit

| | # | % |
|---|---|---|
| Commuting | 57 | 47.5 |
| Other transit trips | 33 | 27.5 |
| Not at all | 30 | 25.0 |

4. Number of cars per household

| | 0 | 1 | 2 | 3+ |
|---|---|---|---|---|
| Number of households | 36 | 51 | 15 | 17 |
| % | 30.3 | 42.9 | 12.6 | 14.3 |

5. Blocks one will walk from home to stop.

| Blocks | Persons | % |
|---|---|---|
| 1 | 28 | 23.3 |
| 2 | 29 | 24.2 |
| 3 | 43 | 35.8 |
| 4 | 20 | 16.7 |

6. Blocks one will walk from stop to destination.

| Blocks | Persons | % |
|---|---|---|
| 1 | 30 | 25.0 |
| 2 | 34 | 28.3 |
| 3 | 41 | 34.2 |
| 4 | 15 | 12.5 |

7. Facilities desired at the stop.

| | No. of persons | % |
|---|---|---|
| None | 15 | 12.5 |
| Heated waiting shelter | 86 | 71.7 |
| Parking | 3 | 2.5 |
| Shopping facilities | 16 | 13.3 |

8. How long a wait is permissable at the transit stop?

| | Persons | % |
|---|---|---|
| Less than 5 minutes | 27 | 22.5 |
| 5 - 9 minutes | 59 | 49.2 |
| 10 - 14 minutes | 22 | 18.3 |
| 15 - 19 minutes | 9 | 7.5 |
| 20+ minutes | 3 | 2.5 |

9. How often should the service operate (headway)?

| | Persons | % |
|---|---|---|
| Less than 5 minutes | 11 | 9.2 |
| 5 - 9 minutes | 24 | 20.0 |
| 10 - 14 minutes | 59 | 49.2 |
| 15 - 19 minutes | 20 | 16.7 |
| 20+ minutes | 6 | 5.0 |

10. How many transfers are acceptable per trip? (5 minute waiting time at transfer point.)

| Transfers | Persons | % |
|---|---|---|
| 0 | 16 | 13.3 |
| 1 | 41 | 34.2 |
| 2 | 46 | 38.3 |
| 3 | 11 | 9.2 |
| 4 | 5 | 4.2 |
| 5 | 1 | 0.8 |

11. Availability of schedules?

| | |
|---|---|
| Posted at stop | 85 |
| Telephone | 29 |
| By mail | 16 |

12. Comparative transit-auto travel times (assume 20-minute auto trip).

| | No. of Persons | % |
|---|---|---|
| Transit 15 - 30 min. longer | 44 | 36.7 |
| Transit 5 - 15 min. longer | 49 | 40.8 |
| Transit same time as auto | 19 | 15.8 |
| Transit faster than auto | 8 | 6.7 |

13. Acceptable fare for a 20 minute transit trip.

| | No. of persons | % |
|---|---|---|
| $1.00 | 0 | 0.0 |
| .75 | 6 | 5.0 |
| .50 | 31 | 25.8 |
| .25 | 37 | 30.8 |
| .10 | 26 | 21.7 |
| free | 20 | 16.7 |

14. The most important aspect of service.

| | No. of persons | % |
|---|---|---|
| Blocks walked to and from stop. | 27 | 22.5 |
| Facilities at stop | 41 | 34.2 |
| Waiting time | 22 | 18.3 |
| Fare | 2 | 1.7 |
| Frequency of service | 15 | 12.5 |
| Transfers per trip | 7 | 5.8 |
| Schedule availability | 2 | 1.7 |
| Transit trip time vs. auto | 4 | 3.4 |

15. Willingness to dispose of one auto if improved transit services were available.

| | | % |
|---|---|---|
| Yes | 35 | 29.2 |
| No | 61 | 50.8 |
| Unsure | 24 | 20.0 |